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THIRTY-FIFTH MEETING OF THE OIL SHALE ENVIRONMENTAL ADVISORY PANEL

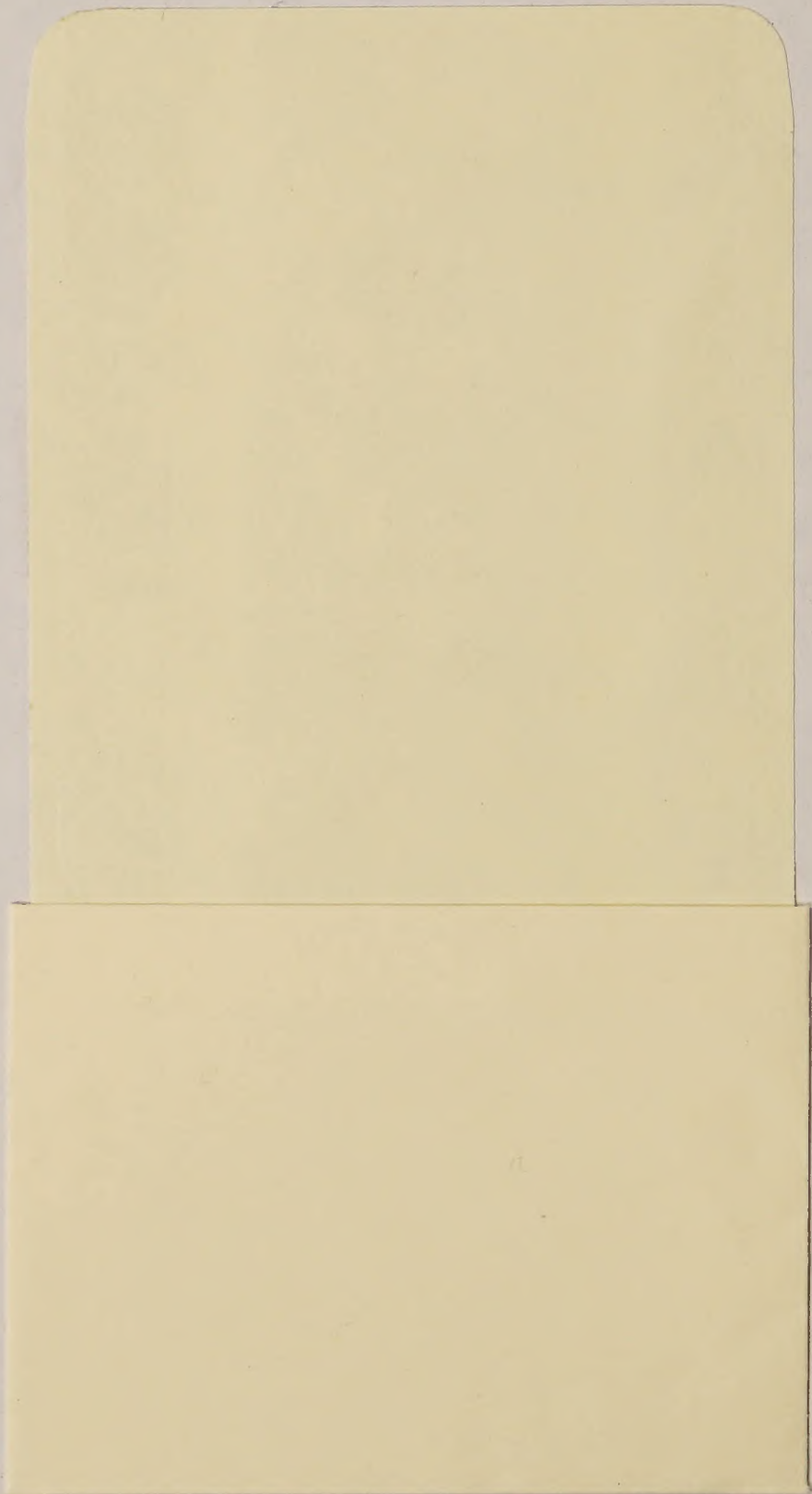
Ramada Inn
Glenwood Springs, Colorado
May 11-12, 1982

PANEL MEMBERS AND INTERIOR OFFICIALS PRESENT

Henry O. Ash, Chairman

Mark Bubriski, Rio Blanco County, Meeker
E. James Bradley, Utah Energy Office, Salt Lake City
Harold M. Boeker, U.S. Fish and Wildlife Service, Denver
Lee Carie, U.S. Bureau of Land Management District Manager, Craig
Neal H. Domgaard, Uintah County, Vernal
John R. Donnell, Industry, Littleton
Collen Fallat, Wyoming Department of Agriculture, Cheyenne
Lloyd H. Ferguson, U.S. Bureau of Land Management District Manager, Vernal
Paul Ferraro, Colorado Department of Health, Denver
J. William Geise, Jr., U.S. Environmental Protection Agency, Denver
Carter B. Gibbs, USDA, Forest Service, Ogden
John T. Goddier, Wyoming Department of Economic Planning and Development, Cheyenne
Mary Ann Grasser, U.S. National Park Service, Denver
Wallace R. Hansen, U.S. Geological Survey, Denver
Andrew W. Heard, U.S. Bureau of Land Management, Colorado State Office, Denver
Allan J. Jones, Rio Blanco County, Meeker
Patricia S. Keyes, U.S. Department of Transportation, Kansas City
Deborah M. Linke, U.S. Bureau of Reclamation, Salt Lake City
Jay Lucas, Colorado Department of Natural Resources, Denver
Marla Mansfield, USDI Solicitor's Office, Denver
Lee Merkel, Garfield County, Glenwood Springs
Peter A. Rutledge, U.S. Minerals Management Service, Deputy Minerals Manager for Oil
Shale, Grand Junction
Clarke R. Watson, Industry, Denver
Bettie E. Willard, Colorado School of Mines, Denver
W. Robert Wright, Public at Large, Salt Lake City

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LIST OF ATTENDEES

Federal Agencies:

Bureau of Land Management
Colorado State Office, Denver

Bob Leopold

Minerals Management Service
Oil Shale Office, Grand Junction

Don Dietz (FWS)
Bob Elderkin
Eric G. Hoffman
Glenn Miller
David Oberwager
Roger A. Tucker

Oil Shale Panel Staff, Denver

Vernon Burns
Elanor David
Catherine Hurlbutt

Industry:

Cathedral Bluffs Shale Oil Project, Grand Junction (C-b)

George Fosdick
Dan Hale
Bob Thomason

Ecosystem Research Institute

John Carter, Logan

Energy and Resource Consultants, Inc.

Don Peterson, Boulder

Chuck Hook, Littleton

Ralph M. Parsons

Steven M. Byers, Pasadena

Rio Blanco Oil Shale Company, Denver

J. Blaine Miller
Butch Slawson
Larry weiner

SOHIO Shale Oil Co. (U-a/U-b)

Bob Dudiak, Salt Lake City

Sunoco Energy Developoment Company

Nancy Kilbourn, Dallas

The Pace Company

Ronald Gist, Denver

VTN, Colorado

Swain Munson, Grand Junction

White River Shale Oil Corporation, Salt Lake City (U-a/U-b)

Ralph Deleonardis

C. E. Doney

Jim Godlove

Jack Lyman

Robert N. Pratt

Press:

Nancy Moore, Synfuels Week, Denver

Mark Ohrenschall, Rifle Telegram, Rifle

Others:

Victoria S. Barker, Boulder

John Jackson, U.S. Senator William Armstrong's Office, Grand Junction

Jane Oberwager, Grand Junction

THIRTY-FIFTH MEETING OF THE OIL SHALE
ENVIRONMENTAL ADVISORY PANEL

Ramada Inn
Glenwood Springs, Colorado
MAY 11-12, 1982

Meeting called to order at 1:15 p.m., May 11, 1982, by Mr. Ash, Chairman.

MR. ASH: I would like to convene this thirty-fifth meeting of the Oil Shale Environmental Advisory Panel. This is our first meeting in Glenwood Springs and indeed in Garfield County. We had planned to have a meeting here for some time and we're pleased that we finally made it to this nice part of the State. I've had some inquiries as to whether there was any relation between our meeting and Exxon's recent cancellation of the Colony Project, and I have to say the timing is purely coincidental. We planned and scheduled this meeting about 6 weeks ago.

Our last meeting was the end of October of last year in Salt Lake City, and at that time the six authorized public member positions were vacant, and I'm very glad to announce that we have now four of the six positions filled by Secretarial appointment; three were appointed in January and one more last week, and I'd like to introduce them at this time. Dr. Bettie Willard, who is head of the Environmental Sciences Department at Colorado School of Mines and formerly a member of the National Council on Environmental Quality. Mr. Bob Wright, an attorney in Salt Lake City, and Clarke R. Watson of Denver, who was reappointed. Those are the appointments that were made in late January. The fourth appointment was made just last week and that is John R. Donnell, a geological consultant in Denver, and was former Chief of the Oil Shale Section of the USGS Geologic Division in Denver, and if you have any questions on the geology of oil shale, why talk to John. We have another newly appointed member from Rio Blanco County, Mr. Mark Bubriski. Mark is not here but Allan Jones, one of the County Commissioners, is here. Mark has taken Duayne Rehborg's place, who now works for the Council of Governments in Rifle. We do have a number of other replacements or substitutes for various governmental agencies and I'd like to have them introduce themselves, the balance of our members now, if we can go around the table starting with Hal Boeker down at the corner, and if you're sitting in for someone, please let us know your agency and for whom you're sitting in.

Hal Boeker with the Fish and Wildlife Service out of Denver

Mary Ann Grasser, with the National Park Service, sitting in today for Dick Strait

Paul Ferraro, Colorado Department of Health

Marla Mansfield, Department of Interior, Solicitor's Office, sitting in for
Lowell Madsen

Lloyd Ferguson, District Manager for BLM in Vernal

Lee Carie, District Manager, BLM, Craig, Colorado

Wally Hansen, U.S. Geological Survey, Denver

Pete Rutledge, Minerals Management Service as of this morning anyway, of the Oil
Shale Office

Andy Heard, Colorado State Office, BLM, sitting in for Cece Roberts

Neal Domgaard, Uinta County Commissioner, Vernal, Utah

Jay Lucas, Mined Land Reclamation, State of Colorado, sitting in for Dewitt John

MR. ASH: Thank you all, we will have a sign-up sheet going around the table a little later so that we have a record of all the Panel members and representatives here.

Relative to activities and other developments since our last meeting, I'll just review them briefly. After that meeting in October we followed that with formal advice memos to Pete's office in about a week, on November 6, we distributed the minutes of that meeting in December, and developments relative to the prototype projects - in December Cathedral Bluffs announced a delay in their development plans, which has further put off our review of a revised DDP for Tract C-b. We'll be hearing more from them later and of course from Pete also on developments and activities.

In January I participated with Pete's office in briefings and a field tour of oil shale projects and some of the West Slope and Utah towns with Senator John Warner of Virginia, who chairs the subcommittee which has been considering oil shale legislation. His bill, S-1484, was reported out by the full committee early this year, but it's not yet been scheduled for consideration by the full Senate. This bill, as you may remember, addresses a number of oil shale issues, including off-tract disposal, and these have already been addressed by the House in a bill which has been passed. The prospects for some action on that bill this session I think are good. Proposals for additional oil shale leasing have been approved since our last meeting and we'll be hearing later from BLM, Bob Leopold of the Colorado State Office, on that program and its progress and status.

Probably the most notable event in this period, at least from the standpoint of the prototype program was the actions clearing the way for and the announcement of White River Shale that they were going to begin development of Tracts U-a and U-b in Utah. Pete and others will be filling us in on that and we will be further considering some of their programs. I had the pleasure of being in Salt Lake City on March 2nd for that announcement and Pete's approval of their DDP.

Week before last the annual Oil Shale Symposium at the Colorado School of Mines was held and was excellent as usual, and coming up this summer is the Oil Shale Environmental Symposium at Vail, which is sponsored by the DOE Oil Shale Environmental Task Force. I don't have that date, I left the flyer at home, if anyone has it you might fill us in on when it is scheduled. We will get that information to you in case anyone is interested in it.

During this period we made about four mailings to the members and also sent copies of news releases as they were available, and it came to a grand total of almost 28 items so we continue to be a paper mill. Three of the items that we have distributed we will be reviewing today at this meeting on the three prototype projects. Distributed at the meeting today is quite a stack of material and I won't try to go through it because I'm not sure what all it is. I would mention that we have put out a new summary for the Prototype Program and of the Panel and its activities, and the last one we put out was 2 years ago, and this one will be available to other interested people as a short summary of the program. In any case, we will go on to the agenda now and begin with reports of the Interior officials. First, Pete Rutledge, and he can fill you in on his new title and organization.

MR. RUTLEDGE: I will do that. I think most of you know that the Conservation Division in the Geological Survey was split off from the Geological Survey last December, to form the Minerals Management Service. It's not clear yet exactly what the final disposition of that body of people will be, but there is a concept that it form the nucleus of a Bureau to pull together the various minerals management authorities within the Department anyway. As to how that goes, I think you will just have to

watch the newspapers. But we still are the Oil Shale Office and we still are there, and really there's been no changes that affect our operation whatsoever. So that's enough for organization.

To go through a few things on each of the lease tracts that have happened, at least highlight them to you, on Tract C-a Rio Blanco Oil Shale Company completed their modular demonstration of the MIS method. Retort 1 was completed toward the end of the year. Production from Retorts 0 and 1, which was the two they burned, 0 was 1,876 barrels and Retort 1 was 24,440 barrels, they are rather precise numbers, but that's oil and condensable vapors, usually slipstreams were taken of the off-gases which were run through standard condensation procedures. So not all of that oil is actually in the tanks because it wasn't economical to recover it all through condensation during that demonstration. That recovery was rather remarkable, it amounts to some 68 percent of the Fisher assay of the rubblized shale in the retort, and I think everybody has labeled that demonstration a technical success, but whether it wants to be carried out, economically or in view of ultimate recovery of resources on Tract C-a is another matter. Retort 1 is cooling down. Oil shale is a great insulator and it takes a long time to cool these down but currently it is cooling we think at the rate of about 50 °F a month. When you figure that temperatures can get up in excess of 2,000° it will take a bit of time to do that. They started a water harvesting experiment on Tract C-a and those of you who are familiar with the long-standing proposal to use water harvesting as a prime method of reclamation on U-a and U-b, it's a similar experiment to see if we can increase the growth of our shrubs and forbs. We are also mightily interested in a reclamation plot on Tract C-a which was the first plot we put in on a Federal lease, at least in Colorado, where it was underlain by processed shale, and used the artificial soil profile above the spent shale and revegetated. It is pretty obvious that the revegetation is a success, but there has been an interesting fact, that plot was set up with leachate collectors. There never has been a drop of leachate in 5 years come through that. That leads you to the question of why, and the most obvious answer is that maybe we have got a big hole in the leachate collector. But if we don't, it could form a valuable piece of information to put in as to the balance that's been achieved. So C-a will proceed this year to try to quantify that situation.

We approved a mining sampling plan to be carried out within the existing mine to obtain the feed material they'll need for running the pilot Lurgi retort in Harmerville, Pennsylvania, and that mining is occurring now. We have also received an interim development plan which will probably be discussed when C-a has the floor a little later on.

As far as C-b goes, the shafts are basically completed to design depth. The ventilation escape shaft of course was secured and it's been allowed to temporarily flood and water has risen in that shaft to about 406 feet of the collar. Work on the production shaft was completed to 1,867 feet, and work is primarily completing the loading pockets and installation of the two 9,500-hp skip hoists in the headframe. Now, since the ventilation escape shaft has been allowed to flood, water production from the two remaining shafts that are being pumped, which is the service and the production shafts, the two big ones, is averaging about 570 gallons a minute, and all of it for all practical purposes is being reinjected, some 500 gallons a minute. The remaining is used in construction, loss from some seepage, or evaporation. Occidental has shipped 50 tons of raw shale from C-b to Union's pilot facility in California for crushing and retorting tests.

In April - if you'll remember, the oil shale lease required a bond, and that bond or the first 3 years was to be based on formula contained in that lease. After the first 3 years it was to be adjusted to actual estimated costs of abandonment procedures and reclamation for whatever was in place, and what was projected for the next 3 years. In April we reviewed the costs of reclamation and C-b has filed a bond now of some \$2,250,000 to cover what's in place currently on C-b. In April C-b did submit their annual report and copies of that have been distributed and you should have them in front of you.

On Tracts U-a and b, and it kind of tickles me that with all the brickbats thrown at the bureaucracy, the bureaucracy, including BLM and the Minerals Management Service, managed to act in 1 day in this case, and that's rather fantastic. On March 1 the Utah lessees did have the preliminary injunction which was effective since 1977 lifted and on March 2 a joint development agreement was signed for the BLM Director in Utah. That joint development agreement sets in place what was always intended to be, that U-a and U-b be developed as a unit, and clarifies some of the nittygritties like bonus from one can be used for the joint development and so forth and so on. We also signed the Detailed Development plan that day. We did make an initial inspection of the proposed access road and RV construction sites and made one interesting decision there. We went out and did that and were coming back past the Ignacio stage stop and that nice flat that's in the bottom of the White River there, and with the construction of the Moon Lake Powerplant and several other roads not connected with the lease development because at that time nothing was going on. That spot in the river bottom was already filled with multicolored buses and everything else and on the spot we decided that our first action would be the RV camp located on Tracts U-a and U-b to take that load right from the beginning, rather than chasing people all over creation. That of course was done after we coordinated with Uintah County and I think everybody came to the same conclusion rather rapidly on that.

So the actual activities on U-a and U-b to date include starting of that access road construction, geotechnical investigation with shallow holes to further define among other things the retention dam site, the plant site, and oil shale storage area. Alluvial well testing was completed last month, and of course the ongoing environmental monitoring program is being stepped up and you'll hear more about that later. Also, since most of this meeting anyway is going to be, at least as far as I'm concerned, concerned with advice on the environmental monitoring plan, maybe a few words about the general philosophy of those plans and what we're going to be talking about are in order. For C-a and C-b we're going to be talking about something called an interim environmental monitoring plan, and that is going to be covering us for a period of relatively low tract activity. The purpose of that type plan is to continue monitoring previous impacts. For instance, we've got a large pile of raw shale on Tract C-b and are also affecting the aquifer system there, and that monitoring needs to continue. It also has the purpose of maintaining continuity of certain critical elements that we defined or parameters. Air quality of the baseline, basically, some of the water quality parameters, and also some of the biological parameters. And then the third purpose would be to evaluate or continuing evaluation of findings for anomalies that have cropped up through the monitoring program. To help to maybe quantify what that entails, we did for our own purposes put out a spread sheet and this has been given to everybody and it basically compares the interim plans with the permanent development monitoring plan, and that may be of some assistance to you as you get to looking at those plans.

For Utah it's a little different story. There we'll be putting in place what amounts to the phased ongoing permanent environmental monitoring plan. If you'll remember the plan to monitor was outlined in the Detailed Development Plan but we get down to a lot more nittygritty than what was just sketched in that Detailed Development Plan and this is the nittygritty and it forms the scope of work and that's given to you in what I think is called a final draft. After the advice of the Panel is received on that and we have finished our review of it, then the final product will be printed.

Also, because some Panel members are new, even John Donnell, but somehow you've heard this before, John, I thought it might be desirable to put together a little paper on where we started with this environmental monitoring and how we got to where we are, because it's taken quite a bit of change, and I think Eric Hoffman did a good job of putting that together and you have copies, and I am going to avoid the temptation to read it but I do commend it to you. Sometime during the procedures here to at least refresh some and maybe enlighten some others as to how it has gotten to the technical stage it's in. It basically sets out the justification for the lease terms that apply, also the goals of that monitoring program. I think it is important to keep in mind as you get into these programs, it's just not really what they call an environmental or ambient environmental monitoring program, and it is just not a monitoring program to meet what is legally required either by the Clean Air Act or Water Act or Mined Land Reclamation acts, or whatever monitoring that must go on there, it has another purpose, and that purpose is to answer the program goals which are really to determine the facts of the environmental, technical, and economic questions of oil shale development. So it's gets much broader in just regulatory compliance.

With that, I'll commend the paper to you, Hank, and that should take care of it.

MR. ASH: Thank you, Pete. Questions for Pete from the Panel, or comments? Okay, we will proceed to the BLM's District Manager reports. Lee Carie who is the Craig, Colorado District Manager for BLM. Lee replaced Marv Pearson, who many of you remember from all his years of attendance at the meetings. Lee, it's nice to have you here. I knew Lee originally back in Washington, D.C., when he was a budgeteer. Lee, do you have any comments?

MR. CARIE: Most of our work lately has been on the new prototype program and we will have a detailed report on that later in the program. Most of our main contact work on the existing prototypes C-a and C-b has been done by Curt Smith, our White River Area Manager, who is in the audience today. In addition, we've implemented some procedures whereby we invite the Minerals Management Service to participate in oil and gas well development within about 3 miles of each of the tracts. The natural gas development on 84 Mesa has continued to increase in scope and size, thereby complicating the alternative sites and plans for off-tract spent shale disposal if legislation is indeed passed to allow for that. In addition to that, we have received, or our State Office has received, about 190 Indian allotment applications. These are primarily on 84 Mesa and each is for 160 acres. In addition to that, the Rio Blanco County Clerk has received approximately 300 claims from we think the same Indians, we're not really sure. At this time we feel that the claims are invalid but we do have to go through a legal procedure of issuing decisions rejecting those claims, because we feel they're invalid because the land has been withdrawn from that kind of an entry. There is no estimate now of when we will get those decisions out, but I suspect it will be within a week or two.

Then I had a little dissertation on the new prototype efforts we are doing, Hank, but I think I'll defer that to Andy Heard. I understand he is going to make a presentation. Thank you.

MR. ASH: Yes. Bob Leopold is supposed to be here later this afternoon (he's here). Very good. We had him scheduled a little later. Thank you, Lee. Comments or questions for Lee? Lloyd Ferguson, Vernal District Manager.

MR. FERGUSON: Hank, we may have started late, but I think we will make up for it. Pete pretty well gave you a rundown on the activities that have taken place of recent note with regard to the lease tracts U-a and U-b. We did also participate in an inspection of a holding pond, part of which will be on tract and part of it off tract, and as interest to this group we have also issued a grant to Uintah County for the road from Bonanza south to Duck Rock and I understand that the contracts have been awarded on that and we will see some activity under way there. The fact is today I believe they are supposedly moving the old stage building up to the American Gilsonite location. We've been working with the Fish and Wildlife Service and the State of Utah to finalize the mitigation agreements relative to the proposed White River Dam. That document incidentally has gone to the printer for final printing on the White River Dam and will be out shortly. I might also bring you up to date a little bit on - because it has been a matter of interest to the Panel in the past - on the Uintah Basin Synfuel environmental statement involving seven different applicants. The preliminary draft of that document was reviewed during a 2-week period April 12 to the 23rd. The environmental project staff in Denver now is looking at those comments and trying to get things in order to issue the draft, the release date for the publication of that draft environmental statement is August 20. Now that is 1 week later than what we had projected but I have been told that it will not change the final release date, and we expect to have the public review of the environmental draft from the date of August 20 to October 19. We, like Lee have been involved with Pete and with the folks in Washington and our Denver Office on both the prototype and the so-called permanent leasing program, and you'll hear more about that. I believe, Hank, that pretty well gives you the Reader's Digest version of what's been taking place here recently.

MR. ASH: Thanks Lloyd. Any questions or comments for Lloyd?

MR. FERGUSON: I might make one further comment. Inasmuch as this hasn't happened before, we did issue a grant for a railroad in Uintah County, and I think that is worthy of note. There's a lot of people who have been talking about a railroad out there, and it's not a very long railroad but it's a railroad nevertheless. It is from the Deserado Mine near Rangely to the powerplant location in Utah and I've issued that grant at least in Utah.

MR. ASH: What's the timetable for construction, do you know?

MR. FERGUSON: We've already had the preconstruction conference and I think they're staging right now. They have a period of time that they are going to have to vacate part of it because of the antelope fawning timetable, but based upon some discussions we had last week I'm not sure that we might not grant a little leeway with the concurrence of the State wildlife people because of the way the antelope have reacted to the activities out there.

MR. ASH: Thank you. I was going to note that with this construction of the access road, when the Panel goes to visit those tracts in late summer or early fall, we'll have a good road to go on and not have to eat the dust that we have in years past. It sounds like now we'd have another option, could we ride the railroad from Rangely?

MR. FERGUSON: You'd have to talk to someone at the powerplant (Deseret) about that, because I haven't any guarantee on that, but the County Commissioners might want to make some comment about it, but they are paving on the new road from Vernal to Bonanza now and the bridge, the decking, is going down and things are moving right along on that road so it won't be too long before there will be a hard-surfaced road on out to the site.

MR. RUTLEDGE: There was one lesson learned from C-a, Hank, after traveling that dust in August, I think John Donnell had some comments on that.

MR. DOMGAARD: Hank, I might comment just a minute on the roads. They are progressing rapidly. I think this coming week they'll be pouring the concrete deck on the bridge across the Green River and on the 30-mile stretch over to Bonanza the preconstruction meetings have already been held, the contractors are starting as of now on the road from Bonanza down to the White River Project, and we anticipate all the projects on the roads will be completed late this fall, so we will have a completed highway from the Vernal area to the mine site by late this fall. The Ignacio Stage Stop, by the way, the one that there's been quite a controversy about through all the years, it is being moved today from the Ignacio Stage Stop, and this is the old stage building, and it will be placed on the grounds up by American Gilsonite in Bonanza, and that is being accomplished today so that's one that has been years in the making.

MR. ASH: Thank you, Neal. We had a few more members come in since we started. I'd like to recognize John Goodier from Wyoming, John, nice to have you here, and Collon Fallat, two gentlemen from Wyoming today. I think that may be a record. John. And Jim Bradley from the State of Utah, and Carter Gibbs from Agriculture, Forest Service, out of Ogden. And Deborah Linke, from Bureau of Reclamation, Salt Lake City. Nice to have you all here.

I said I wasn't going to discuss everything we put out here, but one thing, or I'll mention a couple of things, there is a new roster which is often of considerable interest to people wanting to know who is on the Panel and what their addresses and phone numbers are. We try to put an updated one out at least once a year. If there are any changes or corrections needed, let Elanor know, please, so we can always put out an update sheet. We also have a couple of copies of recent months' progress reports from Pete, I believe, as well as the things he mentioned.

I want to go to what we have scheduled at 2 p.m, the beginning of the review of the prototype lease projects, and I'll turn it back to Pete, and then with the need for overhead projection and so on, we will move aside from the center of the front table and invite you to come up here and use the mike. I'll turn it over to Pete now.

MR. RUTLEDGE: I'll take care of that fast. I will introduce Bob Pratt, President of White River as it's his show.

MR. PRATT: Pete, Hank, thanks a million. We appreciate the opportunity to be here today and meet with all of you. In light of all of the talk that's been going on about oil shale going or not going, we feel it is a distinct pleasure to be here, particularly in the room with so many people that have been a major help to us in assuring that the White River Shale Oil Project proceed. I had the opportunity last week, the day the announcement came out, to talk at an energy panel at Utah State University, and meeting the next day with the Sun Oil Company in Philadelphia to talk about the White River Shale Oil Project and where we were going, and of course the question in everybody's mind is, as I am sure everybody has heard in this part of the country, is shale oil really going forward? I want you to know that White River Shale Oil is alive and well and we're going, as Neal just said a few minutes ago, we're breaking rock today on the tracts and on the roads leading to the tracts, we're going to talk more about that in detail. But we feel very positive about the direction that we are taking and where we're going, and specifically how we're going to get there.

Today seeing there are a few new members on the panel, and several others that haven't been here before, I want to take just a few moments to give you a brief rundown on really who we are, where we have been, and where we are going and the members of my staff likewise will be here to participate in that. What Rees and Roger are passing out for us, and I think it is good that Roger is over here working; Rees, I'm glad to see that you put him to work! This is very indicative of the kind of cooperation we've received and the help we've received from many places. I think when you look at Pete Rutledge and his staff, Neal Domgaard and the other County Commissioners, and Lloyd Ferguson, all of them here in the room today, the BLM and the other BLM people here from Salt Lake and the staff in Salt Lake, as well as other Department of Interior people, without their help we certainly wouldn't be giving you the kind of progress report that we're able to do today. So I very publicly want to thank all of these people and their staffs for not only the support during the last year but being with us since 1974 to ensure that we're able to be in this position.

Now when you go back and look over time and Pete gave you a feel for this, it was in 1974 that the companies that you see here on this slide, and you have copies of the slides with you in the handouts, if you can't see this or can't read it, but the Federal prototype program was installed, we were the bidders, the Phillips Petroleum Company, Sohio Shale Oil Company, and Sonoco Energy Development Company, the latter two being owned by Standard Oil of Ohio, and the Sun Company, respectively. But these are the companies that own the tracts U-a and U-b and likewise the White River Shale Oil Corporation. We are the operating and management company representing these three companies to develop Tracts U-a and U-b, to bring them into production, and then to operate them once we do have them into production. One of the prerequisites that these three companies set in putting together the team of White River Shale Oil Company that all of them be born optimists, many of them Nevada gamblers, and willing to meet any obstacle from any direction and one that could learn the problems of an emerging science called socioeconomics. And so we are going to try to cover all those topics for you today. You also remember in the history in 1977 we did seek an injunction which basically stopped the clock on the leases and the payments that we had to make for these bonus payments and we were able to lift that injunction as Pete indicated to you; we did that on the first of March and Pete and Henry and the staff were in Salt Lake City the next day, on the second of March and we signed the joint development agreement, the DDP was approved as well as the

conditions to move forward. So this is really I think from my standpoint one of the highlights of the progress that has been made on this project almost as significant as that done in 1974. So to me, Pete, we made great strides that day in Salt Lake City in moving ahead, I think, for the industry. And particularly as we will talk to you today the approach that we are taking and how we intend to proceed as has been outlined in the DDP.

Jim, we might put the next chart up. Again this is another significant chart and it's one that I presented to the Sun Management in Philadelphia last week, again to remind them of really what this program's all about and the various agencies and also a great deal of the people that are around this table. As you recall, it's No. 1, to provide a new source of energy by stimulating development of commercial oil shale technology by private industry. I think that's extremely important, the development of the technology, and that is one of the things we're going to talk a lot about today, but it's extremely important what the country was looking at and the experience we've seen with the other companies and the problems that we've had in developing again, prototype technology. Secondly, is to ensure the environmental integrity of the area and develop restorative techniques. You know, I came into the oil shale industry from a different industry but again a mining industry, and I have never seen a plot of land so thoroughly monitored. I don't think there's a place around the globe that has been as thoroughly monitored as Tracts U-a and U-b. We didn't just monitor the two of them as a unit, we monitored each one of them separately. This has been going on since 1974, and we spent about \$10 million just finding out about the environment. Now to me, again coming from another industry I couldn't believe the knowledge that White River has, as well as these three companies, and again, of course, Pete and the information is likewise available to all of you. But we know what is on, around, in, and above those tracts out there I think more than anything else, and fortunately as we proceed we'll be able to understand what we do, how we're going to preserve it and maintain its integrity.

The third point is extremely important to both sides, and I like the way that this has been put. Permit an equitable return to all parties, and when I say all parties I'm talking to the three companies that own it, I'm talking to the public, I'm talking to the Government, and all those who will be connected with it because there is a return to all. And again, last, and Pete, let me give you another accolade, develop Federal management expertise in the supervision of oil shale development. My personal feeling is that the setting up of a group with which we could work and who understood our problems and worked with us on a day-to-day basis is extremely important to the welfare of this country. I think to do anything different, and Pete, I know you intimated such in your comments here earlier, but I would hope that all of you on this Panel and others will recognize the significance of the function that is played formally by the Oil Shale Office and now the Minerals Management Service Group. They play an important role, in my estimation, in the development of one of our important natural resources, and I also think for the national defense of this country.

Now we might move to the next one, and I'll just quickly outline and again tell you what we're going to talk about. I've talked somewhat about the background, I'm going to talk about some of the project schedules, I am going to talk in general terms, and then I'm going to have Rees Madsen, my vice president of Administration, is going to make a presentation and talk from another schedule on really where we

are with permits, our environmental activity, as well as water acquisition, and then Mr. Chuck Doney, vice president and project manager for the project, will go through in much more detail the things we are doing actively on tract now and likewise engineering. That will be followed by Jack Lyman, our director of external affairs, who is going to talk to you about socioeconomics, and then of course Jim Godlove, director of environmental affairs, is going to talk about the Environmental Monitoring Manual, and that will basically take in our presentation that we have for you today. We might move to the next slide now.

What you see here, and this is also in your chart, in your handout, I've included in there the schedules that were in our original DDP, if you'll go past both of those the one that is called Project Schedule, it's dated 4-16-82. This is a slight change from what you see in the DDP and that's why we've included the original DDP schedule. We don't think it's a significant change but it is one that is very important in our reaching our goal. It's in the DDP. Of course our engineering is ongoing. We have our "PSD" that we feel that hopefully will be approved in the next several months.

MR. MADSEN: Some of the handouts may not be complete, if they are not let me know.

MR. PRATT: I would like all of you to have one of these. Our PSD approval is expected some time between now and July. Our engineering of course has been ongoing, but the mine development area, we've been able to get an early start. When I first came on board with White River we weren't looking at really getting onsite until March of 1983. As we have indicated to you, we're onsite, we were onsite 2 weeks ago, we started drilling, we have already been able to blast, how many cubic yards have we blasted out there already? (Chuck Doney, 70,000) So we're off and running in getting into that mine, and to me, being able to break dirt, being an old miner that's the important thing. Whenever you can see mud start to move, that's the thing we're after.

Now under construction, and beginning with the mine-related construction, we will begin that, but on the retorts, the operation sites, we've dropped the schedule about 2 years in terms of when we plan to bring the first retort on-line. We're bringing the mine on-line much earlier but again the retort, because of technology, has been delayed. But what this allows us to do is to take the mine off the critical path schedule so that when we have built the retort we're not sitting back waiting for the mine to catch up with us, we're going down today, we'll go down with our inclines, and Mr. Doney will discuss this with you in much more detail, to reach the ore body, understand what's there from an environmental and safety standpoint, and how we're going to mine it, while we're developing and watching the evolution of the technology for retorting oil shale. I think that one of the problems that we have seen, in some of the ones here in Colorado and elsewhere is that some of that technology is still a generation away. Most of the technology has only been tried on a pilot plant scale. The thing we do have, though, is, and Union is going ahead and this has been clearly stated by Mr. Hartley, that they plan to go ahead, and we have a license with them and our plan is to put in a Union retort as soon as it has been tested here in Colorado by Union. So that is the plan and that's why we have the delay in our schedule, and Mr. Doney will go through that in more detail. Basically, a 2-year delay in the time that we first looked full production for our retorts, and then again through Phase 2 and Phase 3, a year to a year-and-a-half delay as we bring the property on then.

The question might come back later so I'll try to anticipate it now. The reason that we feel White River is going to continue to proceed on this schedule that we outlined to you is because we have set forth a very rational program in attacking really one of the basic fundamentals of the oil shale prototype lease program and that is to develop the technology to understand it and to bring a very complex problem into operation by attacking it, and I think in very simple and logical steps. We are not going in at full-scale production, we're coming in with a base unit so that we can put in all of the facilities, one retort, the upgrading facility, understand what the technology is, be able to adjust and modify that technology so that when we come on-line with our Phase 2 and Phase 3 we have a program that we know will work and give use the kind of production we want to have a commercial operation. So we're taking it in segments and small steps and we think that as we proceed you're going to see a program that is going to continue, it's going to continue on schedule, but it's one that is going to be very viable. So Rees, do you want to now take over with the next schedule and talk about these in detail and I'll come back later if there are any questions.

MR. MADSEN: Thank you, Bob. I appreciate the opportunity to be here this afternoon. As Bob mentioned, what I'd like to do is to discuss on a little bit more detailed basis the schedule for Phase 1, and Jim, if you will go ahead and put the next slide up. The part of the presentation I'll make will be confined to that concerning permit milestones, the aspects of the general administration and including environmental programs we're involved in, and the aspect of water acquisition or water supply, and then as Bob mentioned, Chuck Doney will continue with the discussion of the remaining parts of the Phase 1 schedule.

As most of you recall and as you new members of the Panel have probably heard, the Detailed Development Plan which was submitted in September of 1981 had moved through the review process in the Oil Shale Office and culminated in approval on March 2nd which we discussed this morning as well. Pete makes it sound as if it had been a couple weak kind of effort, and I think it is important to note that the Oil Shale Office did spend many, many hours working with us from September of 1981 until the approval date on March 2, and there was a very exhaustive review and a substantial amount of work went into it. The Detailed Development Plan is the first milestone we have on our chart, and that one has been accomplished of the 80 permits, notifications, and approvals that we've identified as being required through the end of 1985. The next most critical permit is the one associated with the prevention of significant deterioration which is an air quality emission source permit. That application which we have been referring to as a "PSD" was submitted on August 28, 1981, both with the State of Utah as well as the Environmental Protection Agency. In February of 1982 the EPA turned over the approval responsibility and authority to the State of Utah and now our review process is going on with the Utah Bureau of Air Quality.

In regard to the PSD permit application, we expect to be before the Utah Air Conservation Committee around May 24, and assuming that there is an approval order at that time for the permit, we would then go through a 30-day public notice, public hearings period,

The May 24 meeting of the Utah Air Conservation Committee is the one where we expect to see an order coming out. Again we look for a 30-day comment period and we are still expecting that sometime around July of this year we will receive a PSD permit

for the project, which will reserve the increments required for us to look out down the road at a commercial project.

We don't have the other permits. We do have other permits which we are scheduled to talk about later. We have identified 80 separate kinds of permit actions required. The second line that we have on the schedule is called General Administrative, and that refers to the general activities associated with carrying out the corporate program. It also involves the environmental work which Jim Godlove will talk about later, and principally involves the environmental monitoring work as well as the work on the permit acquisition program. The other item which is shown on the schedule which represents an ongoing activity, represents the socioeconomic projections. As many of you are aware, we have published several documents over the last 8 years, since 1976, referred to as baseline and impact projections, and the latest one is commonly referred to as the Gibbs and Hill study, which reviewed the baseline data and laid the foundation for socioeconomic impact projections. So these are the ongoing activities that we see going through this Phase 1 period.

The third item on the schedule is Water Acquisition, and we show having the resolution of the water supply question for our project in the early part of 1983. As you are aware, really since 1974, we have looked to the construction of the White River Dam and Reservoir as being our No. 1 choice so far as water supply is concerned. That is still the case today. The Water Board, which is the group in the State of Utah that deals with water policy and water matters, met last week and concluded a number of committee reports dealing with the purchase or the sale of water to industries in the area, one of which would be the White River Shale Oil Corporation. As a result of that board meeting, we now have a foundation to move forward with the Division of Water Resources and we do expect to consummate a securing of water supply from the proposed White River Reservoir before the end of the year, and in fact it may be within the next 90 to 120 days. That's not to say that we have not looked at other options and alternatives but the White River Dam and Reservoir, as you know, is located very close to our tracts and represents the most economical source of water that we have been yet able to identify.

Those are, then, in a very brief fashion, three of the items that we are working on as far as the Phase 1 program is concerned. Now I'd like to turn the program over to Chuck Doney, who is, as Bob mentioned, our Vice President and Project Manager, to go through the remainder of the schedule, followed by a discussion by Jack Lyman as far as socioeconomics are concerned. Thank you.

MR. DONEY: I am going to continue to talk from this chart here. As Bob pointed out, this initial operation on the site is oriented towards opening a mine. We have our roads under construction now. We started near the end of last month. We think that we will have access near the mine site in the third quarter of this year. The road program is shown extending on out into next year because there is a lot of road development called for up around the mine area. We are actively negotiating with Moon Lake Electric for the power supply for the project. It appears now that probably we are going to build somewhere in the neighborhood of 10 miles of 138-kV powerline from the Bonanza Substation across the White River on the site and then this power supply to the plantsite would parallel our access road. As Rees mentioned, we have finished drilling one test well in the alluvium above the river, on the riverbank, and we're pretty positive that we can develop an initial water supply for construction purposes from one well down there. We may want to drill two wells

down there for standby purposes. He also mentioned the geotechnical program. This runoff dam is the dam that's built down that watershed from our plantsite, and the purpose of it is to reinforce our zero discharge water management program. That is, all of the runoff from the disturbed areas around the mine and the plantsite will be retained by this runoff dam. But that's a fairly large dam and the geology underneath it is complex and takes a lot of drilling.

Our concept on buildings to serve this initial mining construction program is that we will take the permanent what we call Phase 1 buildings and build parts of them to serve the construction program through the opening of the mine. The engineering, as Bob said, is continuing. We have been actively engineering this project for about 6 or 8 months now, and there is a little milestone that is always important to owners, they want to know what this thing is going to cost, so we have promised them an accurate cost estimate at the end of the year.

Then coming further down, we think we'll be able to mobilize field construction forces for the initial mine work and for the mine service facilities in the last half of this year and start actively opening mine openings about the first of 1983. Now in the Detailed Development Plan you saw that we had a concept of two vertical shafts, one which would provide service, men, and materials to the mine, and the other would be a production hoisting shaft. We did a very exhaustive series of studies on this concept of hoisting, and very recently we've decided that probably the better idea is to move the material from the mine through a slope entry, a decline, as we call it, on conveyor belts, and as most of you can believe, for any large tonnage of bulk material movement, the most efficient way to move it is on conveyor belts. So that's our present concept. We propose to start those mine openings about the first of 1983 and we're projecting somewhere between or around 15 months to finish them. Then when the two openings are sunk into a shale zone, we will connect them for ventilation purposes and do a certain amount of test mining.

Now although the surface construction is not active at the present time we haven't forgotten it. We are presently negotiating a license agreement with Union for the use of their retort. This is our present understanding of their startup and demonstration schedule in Colorado which we will watch with great interest. Skipping ahead a little bit, we haven't forgotten the circular grate. You recall that this was in our Detailed Development Plan as our No. 2 retort, but we feel that considerably more testing and more engineering are needed before we commit to a circular grate. Currently in Pittsburgh we have a series of what we call pop tests under way to check the recovery of oil under the process used in the circular grate method. There is also a pilot plant using a circular grate available to us in Cleveland by about midsummer, so we propose a pilot plant test there. After it's evaluated we have allowed for another one next year.

Now all of this retort business affects the quality of the raw shale oil that's produced from the retort so therefore it affects what we call the upgrading process, where you make a marketable crude oil from the shale oil. We tentatively think now that we will have some samples to test the latter part of this year and we can make a selection of a process by midyear and then begin to negotiate a license with the person that is selected. Are there any questions on that program? If not, I will turn it over to Jack Lyman now, who is going to move on into the socioeconomics field.

MR. LYMAN: Thanks, Chuck. One of the things I want to point out as I begin is the importance this project has always placed on socioeconomics. As Bob mentioned, the 2-1/2-year delay of the surface facility has affected the manpower projections that were included in the Gibbs and Hill study. We'll be going through some projections here to show you what our current thinking is. These are the estimates that we've developed from April to June of 1983, the balance of the projections beyond June of 1983 are currently being developed when we get actively into the mine development phase, but we currently expect those to be somewhere in the neighborhood of 150 people, and that will continue through 1983, 1984, into about mid-1985, and as soon as we have those numbers we will be able to make those available. But basically what this shows is a gradual buildup to a peak in December of 1982 of about 188 people. That is the basis for the socioeconomic impact mitigation activities that we will be undertaking during the next few months.

The next slide gives the monitoring. An important component of how we deal with those impacts is going to be a monitoring program that we've instigated on the work force. This is a form that has been submitted to Pete's office and has been approved in terms of the form and the information. We will be doing a complete census of the work force, determining where they're living, where they come from, what kind of housing they want, what kind of recreation they prefer, what kind of skill mix we have, and then in association with this we will also have an extra form which will allow us to keep an updated basis of the work force and the characteristics of the work force.

Of course, one of the first problems that we face is housing the work force. As indicated, work is underway right now for what we call an interim construction camp which will be up to 49 recreational vehicle spots on tract, and we expect our road contractor and the other contractors and subcontractors that we have over the next year to be housed in that spot. However, we also expect a large component of the work force to be a local resident work force that already has housing in the basin area. This chart is based on an estimated 60 percent of the work force coming from those local residents. The current experience that we have with the road crew is that that's approaching 70 percent. So as part of the monitoring program we'll keep track of that to find out if any other action is necessary to provide adequate housing. The on-tract RV park that will absorb up to another 49, then as we get into the temporary monthly peaks out in this area, we'll move in as necessary to secure hotel-motel rooms in the Vernal area. One of the things that makes that a particularly effective strategy is that it's in that nontourist season and our general experience has been that those rooms will be available at that time.

Other impacts that our project is going to cause, because we expect a large proportion of the work force to be local and the nonresident work force that we will be hiring will be coming and living in a single status on tract RV park, we don't expect to have any major impacts over the next 2 or 3 years on the basic infrastructure community system in Vernal and Ashley Valley. We won't be putting 50 or 100 school children into the educational system, we won't be creating the need to build an additional 100 or 200 housing units, and we don't think that we'll be causing a demand for an additional crew of doctors for health care and health care facilities. Those conclusions are currently being reviewed with the local affected entities and with State government. As many of you may be aware, the State of Utah has legislation which is commonly referred to as FB-170 that requires project sponsors such as White River to file a financial impact statement and alleviation

plan. We are in the process of developing that and have held numerous discussions with State government and local officials to put that package together and submit a program to them of how we expect to handle those impacts. And then in support of that, as Rees mentioned we have completed what is referred to as the Gibbs and Hill study and we currently have under way with a consultant a study that we call a cost analysis and revenue study to try and develop information in terms of what the public cost will be to provide for that infrastructure that will be demanded by our population and also to get a better handle on the revenue sources that may be available. That's the conclusion of my presentation. Are there any questions? If not, I'll turn it back to Bob.

DR. WILLARD: How do you handle some of these very permanent impacts from recreational vehicles?

MR. LYMAN: The recreational vehicle park that we're talking about here, the interim park, would be available primarily for the single status workers. In the master plan that we have for the additional development we will be moving in September - I'm sorry, that was the part that I forgot to mention. The more permanent construction camp effort is underway now in terms of engineering and design, and efforts on that will start late this fall and be ready for occupancy in the spring of 1983. That will include a recreational park that will allow nonchildren, or nonschool age children accompanied couples in that park. The bachelor facilities will always remain single status and those workers that choose not to use those facilities would have to find housing in the Vernal area. We don't expect, based on our experience with the mine development contractors, to have much problem in that area.

MR. ASH: Let me interject a point here, when you have questions we'd like to have you use the mike. We want to try to get everything on tape. I would also like to interject one question, Jack. At the hearing in Vernal last fall there was some concerns expressed out of Rio Blanco County, the Rangely area, and you all I know at that time we were talking with some of those folks and I wonder if there's been any new developments or alleviations of those concerns or where does that stand?

MR. LYMAN. The discussions with Rio Blanco County and the people in Rangely have continued, and I will be over there on Monday to discuss these matters with them again. One of the concerns raised in the Gibbs and Hill study is population projections which showed up to 25 percent of the population. The State of Utah was not convinced at that time that that is an accurate projection, and part of the cost analysis and revenue study that is going on now will be to update population projections based on our new work force projections as a result of the change of scope, and then also to verify what percentage of that population will be in Rangely and Rio Blanco County. So those discussions are continuing.

DR. WILLARD: That was 25 percent of what?

MR. LYMAN: The estimate in the Gibbs and Hill study was that 25 percent of the population growth caused by our project would be residing in Rio Blanco County, and that is the first study that ever put it at that high a figure and that's something that we want to verify in the cost analysis and revenue study. The basic model that we're using in that study will be the U-Ped model which is the official State of Utah projection model.

MR. JONES: Are you planning a transportation system from Vernal or the Ashley Valley for your workers or is it just going to be individual transportation or a busing-type system; how are you planning on that?

MR. LYMAN: Right now we have no provisions at this time although we have had some discussions with American Gilsonite who does run bus transportation out to Bonanza to discuss the possibility of adding on to that route with another turn-on to pick up the next shift. We've had discussions also with other bus companies in the area to find out what services are available but we've not reached a solution to that problem yet because we're not sure what the magnitude of the problem is going to be. When we get into the mine development phase, we expect a higher portion of those workers to be coming from outside the local area, but for them to be entirely housed on our tracts, so we won't have the transportation problem. Part of the problem that you have with the impacts that we're talking about over the next 14 months is that there's a tremendous turnover in that work force, primarily because of a different mix of skills and activities that are taking place. As the road crew finishes up another contractor will be coming in to do some of the other site preparation work. So it isn't as if you have a stable work force over an 18-month period on which you could base a transportation system, but we're looking into a variety of options.

DR. WILLARD: What kind of facilities are you looking at to put for these people to have recreation and food and all the basic amenities of life?

MR. LYMAN: During the interim camp it's primarily going to be a gravel pad. We'll be providing water, sewer, security system, and recreational systems. At that point for the 49-unit interim camp they would be best described as minimal. When we move into the bachelor camp, which I have indicated is currently being designed, that will include recreation facilities. The master plan where it calls for the larger camp, in the neighborhood of 2,000 workers, currently includes in the conceptual work swimming pools; tennis courts; softball diamonds; bowling alleys; the normal pingpong, billiards, TV center; movie center, but that would be when we move into that full-scale construction camp.

DR. WILLARD: Are you going to feed all these people or are they going to cook for themselves?

MR. LYMAN: In the interim camp the 49-unit camp that is under construction right now, we will not be providing any dining services. When we move into the bachelors' facilities there that should be available next year, that will include very good dining facilities on tract.

MR. PRATT: One thing I might mention, Dr. Willard, as we go to the larger force in our major camp, we will be looking at a permanent transportation system that we would have at that time. As you can imagine with the small group here, and in starting any project when you start from the beginning you have to start with scratch to bare necessities, but we're moving just as fast as we can and have committed ourselves to Mr. Rutledge and those people that we will be starting on our main camp within 6 months and that engineering is going on right now.

I think it is very interesting as I sat back there and listened to the questions that were raised by this group. I have said many times, Dr. Willard and I remember being with you back in the early 70's when the thrust of the 70's was environment. I

think that the thrust of the 80's is certainly going to be socioeconomics. Socioeconomics not necessarily being the charge of this panel but showing the interest that socioeconomics has in all of the communities where oil shale is operating and how important it is to maintain the quality of life. So we are very concerned about it and that's why we wanted to speak to it today. Are there any other questions that anyone might have?

DR. WILLARD: We hear a lot about what's happened in Gillette and Rock Springs and Craig about psychological problems. Are you going to provide some help for these people, some counseling?

MR. PRATT: One of the things in our Gibbs and Hill study, and you, being new, may not have had a chance to look at that, but yes, that's one of the things that we are looking at. One of the programs that we've seen in the State of Utah that's been used by some of our member companies and others is what we call a troubled people program, which is extremely important and has been thoroughly used in the State of Utah and now throughout the country. It is very important.

DR. WILLARD: How does it work? Or is it all described where I can read it?

MR. PRATT: No, it's not described there, but I'll be happy to send you some information if you would like it, but basically it is a referral-type program to ensure that your people, because there's many problems other than psychological, when you come into a community like this there is a problem with your children, the problems they face, you have the drug problems, you have financial problems, you're looking for where you can find counseling that will best suit your needs.

DR. WILLARD: And I think you're also finding that people are more productive when they have all this nurturing.

MR. PRATT: There's no question about it, there's a rate of return. You reduce absenteeism, you get a more productive employee, and those are the things we're looking at, because people, looking at the location of this site, 50 miles south of Vernal, if you've seen a picture of it or when you get a chance out on the tract it looks like landing on the moon, and so we recognize these problems and we don't want to have a high turnover. We want employees that are going to come and stay with us, because we're going to have a major training program.

MR. JONES: One more question. On that man camp you are preparing, are you going to allow those people to have their own personal vehicles there so that on their time off they can be traveling back and forth into the hills, etc.?

MR. PRATT: Yes, we plan to do that.

MR. JONES: Thank you.

MR. ASH: Deborah.

MRS. LINKE: I'd like to go back to the water acquisition program that you mentioned earlier in your presentation. You mentioned the meeting with the State and they had given you some parameters within which to work with regard to water acquisition. Would you care to share what those parameters were, or is that between you and the State?

MR. PRATT: Rees has been conducting the negotiations so I'll let him talk.

MR. MADSEN: The Water Board met last Friday and we have not seen anything in writing yet that describes the parameters, but, yes, they have told to us by phone and verbally and state they have established a program by which they would have a certain rate established for the sale of water to those people who would prepurchase water within a certain period of time. Then they were also discussing that those people who do prepurchase during that certain period of time after a 5-year period they would be on a different schedule of payment than a group that did not prepurchase and came to them later and asked for water. I'm sure you can appreciate that the basis for the parameters that they will be setting based on the costs of construction of the dam and also the filling of the reservoir and the price that they would be talking about setting would be based on the return required, and the period of time that they would be amortizing their investment, and I think it would probably be best to have you talk to the Division of Water Resources since we haven't seen anything formally in writing. I might point out that we have also been told that their current plans call for moving to the field with construction in 1983, looking at a 2-year construction program which would have water available for us in 1985, and if you recall the Phase 1 schedule, our plan to move to the field for the surface-type construction work will be starting the first part of 1986, so that particular schedule fits very well with our Phase 1 program and the need for water down the road.

MR. PRATT: If there are no more questions, Hank, we really appreciated the opportunity for having been here today and to present this to you. Jim, did you have a question?

MR. BRADLEY: I just wanted to say I spoke to Governor Mathiesen yesterday regarding my trip here and to see if he had any new perspectives on oil shale development, given the Colony Project action and the developments in Colorado, and he remains highly optimistic about oil shale development in Utah, and was particularly impressed with the management team put together by the White River Oil Shale project, and would also like to be placed on record as saying he's been very impressed by the sensitivity shown by your project towards the socioeconomic impacts as reflected in SB-170. And while SB-170 does not have the teeth for enforcement, he was very impressed by your willingness to follow the spirit of that piece of legislation. So I would just like to say that and applaud your efforts.

MR. PRATT: Thanks, Jim, very much. Are there any other questions?

MR. DONNELL: I was wondering if you've done any work on the possibility of acquiring water from the Birdsnest Cavity Zone that you might utilize in your project? I don't know anything about the quantity of that water or the quality or whether you could even utilize it.

MR. PRATT: Yes, we have tested it. The quantity is low and the quality is poor, but we will capture and use it where we can, but there is certainly a very insufficient amount of water we could use. We're looking, when we get to full production, at about 25,000 acre-feet a year. Hank, thanks a million.

MR. ASH: Thank you, Bob. That is a good updating. I might point out to the Panel, that this is in the nature of a progress and status report from White River, not here specifically for our review or action.

The next item is going to be a discussion of the environmental monitoring plan which is something which must be approved by the Oil Shale Office and is offered to us for our review and any comments and recommendations we may have. Pete has submitted it to us in that context, and the Panel members have had that since we sent it out the 27th, which doesn't allow us a lot of time. We do hope you've had a chance to look it over, though, and offer any comments you may have or questions. Pete, did you have something on that?

MR. RUTLEDGE: That was a good update. I thought I'd take a minute to bring up what was happening in the review and approval that goes on after a detailed development plan is approved, because there are a couple of items we will touch on, and maybe this is a good time to apprise the Panel of that. As you know, we started with a Detailed Development Plan. Coming up with an absolute plan for the unknown was a little impossible, so we concocted a method off the top of our head to keep on top of the changes that would be coming in, and they are what we refer to as Conditions 1 and 2, which basically keep on top of all the changes that go on and provide a mechanism to approve it, and as you have been told there will be a schedule change from which the net effect is to step up the timing on the mine and extend by perhaps 2 years the time until the first retort is started. Also some detail on the mine access, which has shifted. I think it's a minor change. It doesn't have any environmental problems, from shafts to an incline access plus shafts. So we will, at the appropriate time when the details of that get together, handle that and approve it. I think, Hank, that is mostly a technical one and unless there are some problems we can handle it that way, and of course it all comes to the Panel anyway.

The interesting thing is also going on with bonus offsets which have started. They will largely be connected with that mine development, and we think it's prudent to start ahead with the mine because there are different things in Utah, and no one has been underground there yet. Most of the projections, in fact, all of the projections that have been done have basically been off of Colorado experience and drill hole experience, and one thing we learned in Colorado and as a miner I'm not surprised, though the geologists may take me to task for it, is that things aren't always like the drill holes say they are. For instance, one of the big areas we're interested in is hydrology, and this particularly goes to looking at it with the White River and how we are going to penetrate the Birdsnest aquifer and get through that, and the water handling, so that we don't repeat problems that we learned about in Colorado, the methane situation and gas and how that is taken care of so we don't have to catch up on that. Rock strength, which is critical in Colorado, and I think many of you people know that we found out the hard way that the strength in the center of the basin, of the rock was not necessarily what it was on the edge. We have also found out that there are some grade variations horizontally perhaps in some of the beds that weren't expected. There is also some sulfur variations which is kind of important for design of the sulphur recovery plant. So all of these things we will be looking at as the mine develops.

DR. WILLARD: What kind of range on that, the sulphur variations, are there, Pete?

MR. RUTLEDGE: Bettie, so far it's fairly uniform, say 1 to 1.5 percent is organic sulphur, that correlates with the Kerogen and pyritic sulphur, which is usually

maintained in a constant ratio. We found out on C-a that there could be certain beds where the most plausible explanation now is that the inorganic sulphur content was high in those beds, perhaps due to secondary deposition in the fractures. One of the other things too, we worried a lot about vertical fractures in the Piceance Basin, and I think we drilled some inclined holes in the Uintah Basin and didn't think there were many but there's some indication now from some of the later drilling there might be some.

DR. WILLARD: Well how is that going to influence the process - I don't know the Union process all that well, but how is that going to influence air pollution control.

MR. RUTLEDGE: Okay, the amount of sulphur? It doesn't particularly influence in the quantities, we're talking about in the retort itself, but it could influence the design basis for your sulphur recovery system. Those that have been around know that we learned the hard way that all sulphur compounds are not produced as hydrogen sulphide, either from modified in situ retorts or others, that a very significant part can be produced as mercaptans or other sulphur compounds which are not addressed by the Stretford process.

DR. WILLARD: What about SO₂?

MR. RUTLEDGE: Part of it. Usually unless you oxidize after retorting, though, your sulphur dioxide is rather low.

Afternoon break at 2:45 p.m.
Reconvene at 3:00 p.m.

MR. ASH: For the benefit especially of new panel members, Eric Hoffman of Pete's staff has got a 20-minute briefing on the prototype program and Eric has volunteered to give that if there is interest from new panel members or others. We would not make this a part of the meeting agenda but have it perhaps after the meeting this afternoon, and we would like to know at the end of the day if you would like to have Eric give that little presentation on the Prototype Program. With that I'll turn this back to the White River staff for their presentation on their Environmental Monitoring Plan. We propose to let Jim Godlove go through the presentation and then come back for questions. However, if somebody has a burning question in the middle, Jim has indicated his willingness to answer them. Jim

MR. GODLOVE: What I'd like to do over the next 20 or 25 minutes is give you a brief update into White River's Environmental Monitoring Manual. The manual has been prepared really for review by the Oil Shale Office and the Environmental Advisory Panel. The draft final version was submitted to the Panel about 2 weeks ago for review, and each of you should have it with you. We've also made copies of the presentation which everyone on the Panel should also have at this time. If not, we can certainly get additional copies to you. As I mentioned, this presentation will be concerned with the Environmental Monitoring Manual which has been prepared by the White River Shale Project.

The presentation will be in three separate parts. First of all, we'll go through the background that led in to the development of the Environmental Monitoring program, then basically what was involved in the preparation of the Environmental Monitoring Manual and then some brief outline as to the components of the monitoring

program. For the newer Panel members, I have a slide here showing Tracts U-a and U-b. Each one of these tracts is 5,120 acres in size, they are contiguous to each other. We've been talking today about the new access roads that are under construction, that begin from Bonanza down to a point called Duck Rock and then from Duck Rock into the mine site, which is in this general area. Basically we have five drainages across the tracts. These include Hell's Hole Canyon, Evacuation Creek, the White River drainage in the vicinity of the plantsite, Southam Canyon, which drains the majority of Tract U-a, and encompasses about 6,000 acres, and then the Asphalt Wash drainage to the west of the tracts. The environmental monitoring program involves monitoring stations over the entire tract area and also points off-tract as well.

Bob Pratt mentioned a little bit earlier this afternoon about the goals of the prototype program. Now the goals of the program include several environmental aspects and those are listed here. First one, of course, is to ensure the environmental integrity of the area during the development of the project, secondly, one of the goals of the prototype program is to develop methods which will ensure the protection of the environment and all aspects of the environment, and finally I really see an environmental aspect of the development of the lease management expertise, not only as a part of the Oil Shale Office but also on the part of the lessees themselves. Now each of these goals of the prototype program is embodied within the lease stipulations. Section 11 of the lease incorporates three separate environmental stipulations. First of all, the lessees are required to comply with all applicable standards, be they air, water, solid wastes, land reclamation, or whatever. Secondly, the leases must be developed in a manner which minimizes the disturbance of land on tract and in vicinity of the tract and also to develop means to reclaim all disturbed areas. And finally, as a part of the lease were included a series of very extensive environmental stipulations. Specific among these environmental stipulations is Section 1(c) and I would like to briefly mention what 1(c) requires. That basically is the foundation of what we're discussing today. It says basically that the lessees shall conduct a monitoring program before, during, and subsequent to development operations. The monitoring program shall provide a record of changes from conditions which existed prior to development, provide a continuing check on compliance with provisions of the lease, and applicable standards, and timely notice of detrimental effects and conditions requiring correction.

In compliance with these lease stipulations White River then became involved in an environmental monitoring program. This program was begun in 1974 shortly following the issuance of the leases to the owner companies, and extended for 2 years to the end of 1976. The baseline monitoring program involved a total environmental characterization of the sites. This included air, water, soils, and geological investigations; terrestrial and aquatic investigations; scientific, historical, and cultural investigations of the site. It also involved an investigation of a 1-mile corridor around the tracts as well. All of this culminated in a final environmental baseline report which White River published in 1977. Prior to the completion of the environmental baseline program, though, White River published its first Detailed Development Plan, which occurred in June of 1976. However, I am sure that you know this Detailed Development Plan was not approved because development of the tracts was interrupted by a suspension of the lease terms.

During this suspension period White River involved itself with an interim monitoring program. This was conducted from the year 1977 through and including 1980. The

scope of the interim monitoring program was more limited in nature to that of the baseline program, that involved generally a lower level of environmental monitoring. However, during the interim monitoring program one of our goals was to confirm the data that we collected during the baseline and basically to continue to establish the baseline for the area. It also had a primary goal of identifying trends, environmental trends which existed on tract, and finally to continue the reclamation research which was begun in 1975.

During 1981 and 1982 White River moved into what we termed a predevelopment monitoring program. Now this program basically began with a complete review of all the historical data that White River had collected since 1974. Based upon a review of the historical data, White River then began an intensive coordination of all the data collected and data interpretation among the various environmental disciplines working for the project. The primary purpose of the predevelopment monitoring program was to identify data gaps which existed in the environmental baseline and to fill those gaps. So what we tried to do here was to complete the baseline characterization on tract. And then all of this led ultimately to the development of our long-range monitoring plan and of course this resulted in the preparation of the environmental monitoring manual which you have before you.

As was mentioned earlier, White River prepared an updated version of our 1976 Detailed Development Plan and that was published in late August or early September of 1981. Included in the Detailed Development Plan was section 6, which describes in detail in an outline fashion, though, the environmental monitoring programs which White River intended to conduct during the life of the project. Because section 6 did not include the necessary detail by which the Oil Shale Office could review and approve our monitoring manual, they conditioned approval of the Detailed Development Plan upon White River preparing the manual that you have before you today. This sequence, again has led to this manual.

White River's environmental monitoring program basically involves three separate goals and I'll go through these fairly quickly. No. 1, is to allow assessment of the environmental changes which are occurring on tract as a result of project development. We term this impact analysis. It is not only important here that we identify changes, it is not important that we simply quantify these, the level of change that occurs. What is important is that we also trace that impact back to the source, and this basically leads us into the second principal goal of the program, and that is to guide analysis of cause and effect, and we've termed this pathway analysis. As I mentioned, it is not just enough to determine that a change has occurred, it is important to determine what caused that change, be it White River Shale Project, be it some other project in the vicinity, or nature itself. And finally, the third principal goal of the program is to guide and assess the effectiveness of mitigation and reclamation measures. We basically term this feedback; that is, after we have detected an impact and we've followed it back to its source, whatever that source may be, we then determine what sort of efforts White River can take to minimize any identified adverse impact.

A very important aspect of our monitoring program is the philosophy which we have used to develop the monitoring program. Basically White River has four guiding principles for the development of the program, and those are mentioned in the first three bullets here. First of all, ecosystems are very dynamic, they are constantly changing. Secondly, ecosystems respond to both natural and to anthropogenic or man-caused inputs. Thirdly, ecosystem response is quantifiable. It is something you

can measure and get a handle upon. However, in order to quantify how the ecosystem is responding to certain either natural or anthropogenic inputs, it is quite important that the monitoring program be developed which incorporates knowledge about the structural, the functional, and the various rate processes that are involved in the ecosystem. So these are the four guiding elements of our program, and this has basically led us to what could be called the philosophy of our monitoring program that is, we're intent upon ecosystems analysis. Now ecosystems analysis is a statistically based approach to monitoring. It is derived in a very logical manner based upon our understanding of the ecosystems on tracts U-a and U-b, and as Bob Pratt has mentioned, we have invested substantial sums of money and substantial time in gaining a knowledge of how the ecosystems function on U-a and U-b. Ecosystem analysis is pathway oriented and this is very important. We're not just out there collecting a lot of data because there is data to be collected. We want to determine along what pathways impacts will be manifest at some receptors. Because of that we are pathway oriented. And finally ecosystem analysis involves a more or less holistic view of the environment, which basically means that the whole is greater than the sum of the parts. What we're trying to say here is that by measuring individual parameters or looking at disciplines by themselves as opposed to looking at parameters, at the relationships among parameters and the relationships between the disciplines you cannot get a full picture of environmental change. Because of that our program emphasizes in looking not only at parameters but relationships among parameters, not only at individual disciplines but the entire environmental program itself and tries to combine that into a single and rather holistic view of the environment. This is basically the philosophy of our monitoring program.

I'd like to discuss briefly the program logic. These are basically the steps that White River took in designing the environmental monitoring program. In our opinion the first and the most important step in defining environmental programs is to identify the probable impacts associated with your project. Obviously, you cannot go out there and set up a monitoring program until you have a feel for what it is you would like to monitor. Section 5 of the Detailed Development Plan provides a very extensive review of the impacts that we expect to occur from our project. The Environmental Monitoring Manual basically summarizes those impacts in the very first section of each discipline of the Manual and then goes on to identify how we are going to go about measuring those impacts. Following identification of the impacts, of course, the next step is to identify what parameters will allow you to measure these impacts. Now parameters are selected based upon their relationship to the impacts, their ecological significance, for instance. Does this parameter, is this parameter capable of being measured more or less in real time? Can we get data back quickly so that we can detect an impact as soon as it occurs and not months or years following the impact. So parameter identification is a very important aspect of the monitoring program. Now White River has developed a three-tiered approach to selecting parameters and this approach is ongoing. The approach selected basically involves three different types of parameters. The first we term operational parameters. Secondly, we have potential parameters, and thirdly we have contingency parameters. Now the operational parameters are those that are essential to a long-term monitoring program. The potential parameters are those which are promising, but for which we cannot tell at this particular time whether they belong in a long-range monitoring program. We see that a number of the potential

parameters that we have identified in our monitoring program as having great value to us in time but that still involves additional work, additional research to determine whether these parameters are indeed appropriate for a long-range monitoring program. The potential parameters that we have selected tend to be community level parameters, that is, you measure one parameter which is indicative of two, three, four, or more different types of parameters. The main purpose of looking at community level parameters is to reduce the cost and, hopefully, to increase the effectiveness of the monitoring program, without going out there and just measuring all of the environments which can be quite expensive and time consuming. And then the third level of parameters are the contingent parameters and those are the ones that you measure whenever your operational and potential parameters fail to identify what caused the change that you have detected. Following selection of the parameters you then have to determine at what sites you are going to measure these parameters. Now this is very important because you must first of all determine what impacts you expect to occur, what is the pathway of that impact, or how might that pollutant reach a receptor. You then locate your sampling site along that expected pathway. Now sample-type selection is also important because of the interrelationships between the disciplines. What we want to make sure is that we are collecting, for instance, precipitation data at the same location that we're collecting vegetation data, because these two parameters are related.

Next we must select an appropriate sampling schedule. Here again this schedule must allow for the collection of a statistically significant number of samples, and secondly, schedule selection also involves coordination among the disciplines. We must be sure, for instance, going back to my previous example, that precipitation data is collected at the same time as the vegetation related data. Following the selection of the schedule you then have to determine what methodology you are going to use to sample the environment and then how are you going to analyze the data that you collected. Sampling methodology involves very extensive quality assessment and quality control procedures. These are mentioned in the Environmental Monitoring Manual.

Data analysis is also a very critical aspect of any monitoring program because it is of no value just to go out there and collect data. If you can't interpret the data it is worthless data, and we've given a great deal of thought as to how we are going to handle the data that we are collecting.

And then finally contingency planning. This is basically what do you do when you detect something that you didn't expect to detect or when you can't explain what it is that you have detected, and each of the disciplines involves how they are going to approach contingency planning. Now the manual is arranged in this format. First of all, we have an introduction which basically describes our approach to monitoring. Much of what I've gone through is contained in the manual, and we have five chapters which discuss each of the individual disciplines, air, vegetation, aquatic biology, terrestrial wildlife, and water or the hydrological aspects. Then we have another section involving special studies. These are primarily research-oriented projects, during the life of the project. And finally the last chapter involves ecosystem analysis. This chapter basically tries to inform people what we know about the environment of U-a and U-b and how everything relates to each other and how we're going to go about monitoring those relationships and detecting impacts.

I'd like to just briefly now run through each of the disciplines and give you a feel for what each discipline, what their primary goals are, and some of the parameters which we will be measuring in these monitoring programs.

The first program is our air resource monitoring program. The principal goals of the program are fivefold. As in each of the programs, impact detection is a critical element of the program. We're not just out there collecting data for data's sake. We're out there trying to detect what impacts the White River Shale Project is having on the environment. Secondly, the air resource program is developed in a manner that will allow us to determine if we are indeed in compliance with all applicable standards, and these include the National Air Quality Standards, PSD standards, and numerous other Federal and State standards as well. The third principal goal of the program is an evaluation of the pollution controls which we will be installing on the project, how well are they working, are they working well enough to sufficiently protect the environment? With this goal, we will combine both the field environmental monitoring program and the source monitoring program which has not been developed yet and will be developed as the engineering proceeds on the surface facilities design. The fourth goal involves an evaluation of the regional evolution of air quality. This involves looking at White River's contribution to air quality in the region and it also involves an assessment of how other developments in the region are affecting the White River Shale Project vicinity. Regional evolution also involves a rather detailed look at visibility in the region as well. And finally diffusion characterization. What we're trying to say here is that the meteorological conditions that exist on tracts are really the prime force for determining what sort of air quality will result from the White River Shale Project, and the only way to determine regional air quality is to have a very good understanding of how air pollution diffuses in the atmosphere, and this is what we're trying to do here. We've got a very extensive meteorological monitoring system located around the tract to characterize the wind patterns and the atmospheric stability in the vicinity of the tracts which is indeed very complex terrain. This goal is very important also in feeding into our environmental air quality modeling as well.

Now the air resource monitoring program is being phased in, as really all of these programs are. The Phase 1 air quality and meteorological monitoring facilities are less elaborate, less wide ranging than those which will be installed during Phases 2 and 3. Basically the program will involve continuing air quality monitoring. During Phase 1 we'll be monitoring air quality at four sites around the tracts. Meteorology will be monitored at five sites around the tracts, and each of those monitoring systems will grow as we move into subsequent phases. Visibility is again a very important aspect of our monitoring program. However, we have not developed a visibility mode monitoring program to date, primarily because we see this as a regional problem as opposed to the responsibility simply of White River Shale Oil Corporation, and we will be developing a regional visibility monitoring program in association with other projects and governmental agencies in the Uintah Basin. And noise monitoring is also involved in our air quality monitoring system.

In the vegetation monitoring program the principal goals are really threefold. This is basically what we've been doing for the last 7 years, documentation of environmental trends which exist on tract. That aspect of the program will continue as the program develops. Secondly, we are attempting to quantify how the plant community responds to the project as the project proceeds. Here again, this is related to detection of impacts and a quantification of the severity of those impacts, and thirdly, an evaluation of reclamation success. Reclamation research has been a very important element of White River Shale's continuing environmental

program since 1975. We have developed a philosophy which we intend to use to reclaim all of the disturbed areas on tract, and of course the vegetation monitoring program will allow us to evaluate the success of our reclamation technology. Now the principal indicators which we will be using in the vegetation monitoring program, here again these are detailed in the manual themselves, but these are the major ones. Growth of annual biomass, perennial growth, basically what we are going to be doing there is measuring sagebrush leader growth. Sagebrush was selected primarily because it exists throughout the tracts and is a very good indicator of the productivity which exists on tract. Soil chemistry and microbiology are also important aspects of our monitoring program. Soil chemistry is important because of its impact on microbiology. Plant condition and use is also an important monitoring element because it gives us a feel as to how suitable the tracts are for use by wildlife and livestock. Of course, we have a lease requirement that we maintain the present populations of wildlife use on tract, and so measuring plant condition and use is an important element of our monitoring program. Lichen growth is involved in our program primarily because of the identified impact of air pollution on lichens and the fact that they seem to be a very good indicator of air pollution and the amount of air pollution that's being generated by a facility. Litter falls is an important parameter because basically this provides to some degree an indicator of the viability of the plants on tract. For instance, if you have a lot of seed production from plants you also have fairly good vegetation, condition of vegetation appear to be very good. If you start seeing seed production fall off, then obviously something is going on here that you need to monitor a little bit further. Plant chemistry is also an aspect of our monitoring program primarily because of the air or water-transported pollutants from the project and how they might influence the plant community.

So far as site locations, there are four major types of vegetation on tract. Our vegetation monitoring program, we've located five monitoring sites within each of the four major vegetation types throughout the tract area. We've got very complete coverage of the tracts. This program involves a controlled treatment philosophy.

In the area of aquatic biology, the principal goals are somewhat different than the other disciplines, primarily because aquatic biology was measured during the initial baseline characterization from '74 to '76. Aquatic biology monitoring was discontinued in early 1977 and was not begun again until 1981. So one of the primary goals of our aquatic program is to reestablish the baseline. Our approach to monitoring aquatic biology is somewhat different than the approach used during the initial baseline program. Basically, we are trying to use in situ substrates in determining how those systems are affected by project-related pollutants. Another very important aspect of the aquatic biology program is to develop sensitive monitoring tools. What we're trying to achieve here is a fairly rapid turnaround in data. We want to be able to detect an impact fairly rapidly, and to do that in the aquatic system we feel we must develop better tools than currently exist for monitoring aquatic ecosystems. Thirdly, the impacts that we expect to occur from the White River Shale Project on the aquatic biology of the area would tend to be very subtle. Here again we are planning zero discharge so the impacts will manifest over very long periods of time, and for us to determine those impacts on as short a timeframe as possible we obviously must develop very sensitive monitoring tools.

And finally the monitoring program is being developed with the full knowledge that eventually the White River Shale Project will be affecting a lake environment as

opposed to a stream environment. The principal indicators are discussed in great detail in Section 4.1-1 and involve looking at both abiotic and biotic parameters.

Water quality, of course, is a very important parameter in looking at aquatic biology. We're also saying that really the physical characteristics of the stream are equally as important as water quality in determining how the biological community in the streams respond to outside input. As far as biotic factors are concerned, we are of course looking at the primary consumers and producers, the paraphytes and the macroinvertebrates. We are also looking at potential parameters measuring data on decomposition in the stream and also looking at how important measurement of production and respiration ratios may be for the project. Now White River has, since 1981 when we reinstituted our aquatic biology program, looked at a number of locations in the White River and also in Evacuation Creek, which is a perennial drainage across our tract into the White River. However, for our long-range monitoring program, we have selected three separate transects within the White River, one upstream of the tracts, one directly right next to the tracts, and then one below the tracts, to serve as our monitoring locations.

As far as terrestrial wildlife, the principal goals here again are impact characterization and secondly an evaluation of reclamation success. Here again one of the aspects of our lease is that we return the land to its present level of productivity. To do that we must be able to evaluate how successful we've been in the reclamation aspects of our project. Secondly, terrestrial wildlife are very important elements in determining how successful your reclamation efforts will be. Obviously, if you get a tremendous invasion of newly revegetated areas by terrestrial wildlife feeding upon this very succulent vegetation, your reclamation success would not be great, and so we need to monitor terrestrial wildlife and find ways of preventing them from destroying what we hope to have successfully reclaimed. So far as the principal indicators, there are a number here. Small mammals are very important, primarily because they are relatively immobile. They are very site-specific and because of that if we start seeing changes in small mammal populations, then we can expect something to have occurred which caused that change in the small mammal population.

Reptiles again are also an important monitoring element because we found that their populations tend to be very stable regardless of the climatic conditions. Here again reptiles are not wide-ranging animals. Birds are also important because they are a very strong indicator of site suitability. Birds go where they find food, they go where they want to. Obviously, if something is occurring on tract which they don't like, the birds will not appear, and so by monitoring bird populations we can get a feel for site suitability. Invertebrate populations are also important because they tend to provide feed for the higher orders of organisms and changes in the invertebrate populations could ultimately mean changes in any of these other three monitoring parameters. A number of other monitoring parameters will also be instituted. These involve looking at raptors, threatened and endangered species, big game. All of these will be done on a periodic basis, depending upon the importance of collecting that type of data. As far as selecting the sites for the terrestrial wildlife program, of course we are looking at habitat type, and as I mentioned, there are four different types of vegetation on tract. We have monitoring facilities in each of those. The monitoring involves a controlled treatment type of a program, and the sites were selected which here again allow for multidisciplinary review of the data.

Water resources. I hasten to mention that we are now dealing with a Utah property, we are not dealing with a Colorado property with the White River Shale Project. Because of that, the precipitation regime in Utah is different than the precipitation regime in Colorado, so we need to shift gears and start thinking about the relatively dry, cold desert environment of U-a and U-b. Our water resource monitoring program recognizes the fact that we only receive 8 to 10 inches of rain a year on U-a and U-b, and that to a great extent will determine what sort of hydrological impact White River Shale Project will have on the hydrological environment. The water resource program involves three major monitoring areas. First of all, surface water. We will be monitoring as the lease requires upstream on tract and below the tracts of the perennial streams, particularly the White River. We also have a monitoring station on Evacuation Creek as well. There are numerous ephemeral channels on tract. These include Southam Canyon, the plant canyon which drains into the White River, and also Asphalt Wash. These also will be measured. There are a number of impoundments planned on the tracts, both to collect runoff from the processing plant and the processed shale disposal area. These impoundments will be monitored as part of our surface water monitoring program. The water quality parameters that have been selected have been selected through a very detailed criteria analysis, and these parameters are detailed in the manual.

Ground water is a second important monitoring aspect in the hydrological program. We basically have three areas of concern here. The first area in which you might expect leachate to be transmitted is into the alluvium. We will be doing extensive monitoring in the alluvium in the plantsite and also the processed shale area. The vadose zone is basically the unsaturated zone which lies essentially beneath the alluvium but above the Birdsnest aquifer which exists within the Green River Formation. And we will be doing quite a bit of monitoring within the vadose zone itself. And finally the Birdsnest aquifer. The Birdsnest aquifer monitoring will not be extensive primarily because if we start seeing impacts in the Birdsnest aquifer we've obviously missed those impacts in the first two monitoring regimes. Basically, I think we can say that we shouldn't, if we're not picking up impacts here we shouldn't pick up impacts in the Birdsnest aquifer as well. Because of that Birdsnest aquifer monitoring, while it is an important aspect of our monitoring program, it's not the most important aspect of our hydrological program.

And finally climatology, we have 10 precipitation monitoring stations on and around the tracts and 2 pan evaporation sites, which will continue to be monitored. White River is also proposing a series of special studies. These are contained in Section 7 of the Monitoring Manual. There are seven of them. First of all, a program element demonstration. Basically, what we're trying to do here is to prove that our monitoring program is sensitive to the level of impact that we expect to occur on tract, so what we will be doing here is inducing impacts on a very limited scale, seeing if our monitoring program is sensitive enough to measure those impacts, and thereby convincing ourselves that our monitoring program is indeed sufficient to measure the subtle impacts that we really expect the project to create. The second special study involves a continuation of our reclamation and research program. As I mentioned here, White River has been involved in reclamation research since 1975. What we've tried to do in this section is to put in one place all of the research efforts that White River has been involved in, and basically to let people know that White River has done an extensive amount of work in this area, has developed a very

good data base, and its reclamation technology is one that should be successful when applied to a commercial size operation. Of course, the proof of the pudding is in this aspect of our special studies, and that is we plan to conduct a very detailed research program on a small plot developed during the initial operation of Phase 1. The area that we plan to develop here will be about 25 acres in size; we'll be looking at methods of disposing of the processed shale, compacting the processed shale, what are the hydrological aspects of compressed, processed shale? How much leachate will be expected to occur, depending on how it is compacted? And we will be looking at revegetation concepts, basically to prove our water harvesting approach. We will also be monitoring air emissions from the plant to see if the emission factors that we have been using for processed shale disposal are appropriate.

The final aspect of this research program involves how do we keep terrestrial wildlife from destroying what we're trying to accomplish here, and so that is a very important aspect of this program as well.

Subsidence monitoring, hazardous waste monitoring, sediment characterization, and a raw shale leachate study are long-range monitoring elements. One last slide. The final chapter of our environmental monitoring program involves ecosystem analysis. I want to just reemphasize what the principal goals of the monitoring program are. First of all, to detect impacts. Secondly is to identify what pathways the impacts will manifest, and finally to provide feedback to the design, construction, and operation of our processing facility so that the plant can operate in a manner which minimizes adverse impacts on the environment. As I mentioned, the program is developed with an understanding of how ecosystems operate. We haven't simply gone out there and collected a lot of data simply because data needed to be collected. We have tried to identify what we know about the ecosystems on Tracts U-a and U-b to develop a monitoring program that is sensitive to that ecosystem. However, this is not a model. We have not developed a model that we will be following here. We have simply used the ecosystem concepts to develop a monitoring program and then applied this conventional statistics approach to get a handle on the data. The "Monitor" program involves not only looking at parameters but relationships among parameters, not only inside disciplines, trying to develop or understand the data we are collecting within this discipline, but also among disciplines, how to help us to develop a computer program which we can use to determine or monitor impacts. Specifically, this does multiple regression analysis of all of the data we have collected on tract through the use of "Monitor." It is simply another tool that we can use in detecting whether an impact has occurred, and allowing us to trace that impact back to a source.

Well that in a nutshell is White River's Environmental Monitoring Program. Maybe it's been a little bit long but hopefully this will help.

MR. ASH: Thank you, Jim. I am sure that Dr. Willard is pleased to hear this presentation coming back to her from industry as she pioneered in the education of engineers and geologists in ecology and the application of the principles and I'm sure she is glad to hear that. I thank you Jim. We have a little scheduling problem here in that we had scheduled at 2:30 p.m. a presentation from BLM on the leasing program, and Bob Leopold came over from Denver to do this for us, and he does need to get back to Denver this evening. So I'd like to defer questions and comments; I hate to do this and if somebody has a burning question or comment right now let's have it and then we will come back to this and other questions or comments

a little later. Bob, do you want to come forward. Bob can correct me if I am wrong, but I believe he is the Oil Shale Program Manager for BLM and he is located in the Colorado State Office in Denver.

MR. LEOPOLD: Thank you, Hank. One thing I would like to correct in the very beginning, it was on the program schedule. I would like to talk about the Oil Shale Management Program. You see the words on the program, of leasing - leasing is one component of the oil shale program that we think of in the Bureau of Land Management. I think it is more than just jargon. I think it is an essential element. Leasing is one component of it, it is a very important factor but it is not the whole program. In general, what I'd like to do is go through what we perceive the elements are of the oil shale management program, tell you some of the specific things we are doing in Colorado and then have a very short question and answer period. I am not going into specific details because we are running late; I think you will find in the handout that many of the specific questions that you do have are answered there.

We see four or five major components of the oil shale management program. Very briefly they are, to enact a national oil shale program, we are presently preparing a programmatic environmental impact statement; that's the first component. The second component is the regulations, to enact an oil shale program, and I will explain these in more detail in just a moment. The third, that most of you are familiar with, is the continuation of the prototype program here in Colorado. The fourth is the planning effort that is going on and will be going on in Utah, Colorado, and Wyoming to enact a permanent oil shale program if it is decided by Secretary Watt that we need one. And the fifth component, and I use as an example in the handout, is the Chevron Environmental Impact Statement. In other words it's an undertaking by private enterprise that requires that they need a right of way, they need a land exchange, or they need something that initiates the NEPA process of which the Bureau of Land Management or another agency has the lead to enact the Federal action.

Let's go back and take them one at a time. The National Programmatic Environmental Impact Statement that we started roughly in December of 1981 is for the purpose of analyzing the Program, in other words, what is the essence of the Oil Shale Program? What it is going to be, and what it isn't going to be? And what are the various alternatives of that program, and also what are the various production scenarios that we see in Utah, Colorado, and Wyoming? We've narrowed the study down to those three basic states. We fully recognize that there are other major formations - back east and a little bit in Alaska, but those are predominantly out of Federal ownership, subsurface. The regulations we are presently working on concurrently with the programmatic. They will set the program direction and I don't think I need to go into detail on the regulations at this time. They somewhat pattern the coal regulations that I'm sure many of you are familiar with. Of particular interest to this group probably will be the prototype environmental impact statement or as we call it the supplementary environmental impact statement that we're presently doing, and Curt Smith is heading up in Meeker.

About 3 or 4 months ago we went out to industry to try to get an interest from them to see if they were, in fact, interested in oil shale. Specifically, for the development of associated minerals in the Saline Zone and also for continued development and encouragement of true in situ here in Colorado. We limited it to Colorado, we limited it to the existing land use plans that were in place and approved, and I think that is the key, and we also wanted to only supplement the

existing prototype environmental impact statement. I believe Bob from White River explained what the purpose of the prototype program is. That remains intact, the same basic philosophical beginnings that the prototype program has, that's still the Bureau's position.

We started out with approximately six tracts; we've narrowed that down to two. You can see in your handout, there it is on the third page. It shows the locations of the tracts that we are considering. If you are familiar with the old prototype EIS, we called that C-11. It's one of the tracts that we are continuing to further study. We added one new tract that we now call C-18; if you are familiar with the sodium lease tracts that are in Colorado at the present time, that is one tract that we are studying for the prototype. As you can see from the schedule we hope to have a final decision by Christmas time of this year and, hopefully, the beginning of the competitive leasing project by April of 1983. I would encourage you at this time if you do have any information that you would like to share with Lee Carie, the District Manager in Craig; Curt Smith, the Area Manager in Meeker; they would be willing, I'm sure, to listen if you have any ideas, criticisms, or whatever, of how we are operating on the prototypes. That offer goes for myself too. We need your information, we need your generous participation through this whole process. We hope also in August to have the draft environmental statement out and hold hearings on it, on its adequacy. So at that time I do encourage you to participate in that process. If it is decided by Secretary Watt to have an oil shale program, we will put oil shale in a multiple-use context, just like we do everything else. At present, we will amend the existing management framework plan, or as we call it, the land use plan that is in Meeker, the White River Resource Plan. As you can see on the schedule we will initiate planning sometime in early winter of this year. Hopefully, finalizing that and resulting in an EIS somewhere around September or October of 1983. The first possible lease sale would be in April of 1984; that's the present schedule. It may change or it may remain intact.

I think one of the important things that I would like to share with you, when we had the programmatic, one of the important recommendations of the Regional Oil Shale Team was that we take a look at another schedule, or another method of leasing oil shale. At the April 15 Regional Oil Shale Team meeting that was held in Denver, out of that came a recommendation that we change the present process that we are considering for leasing oil shale. By that I mean that their recommendation was to delay the oil shale leasing by proposing a different process for planning. If you are familiar with the coal methodology for leasing, that in essence is the process that they recommended. In other words, we would do our typical land use planning and multiple-use decisions, pause, and then we would do what we call activity planning, activity planning being site-specific evaluation for the oil shale tracts that we would recommend, and then we would go into a competitive leasing phase. By doing that, the program in essence from the schedule that you see right now would be delayed anywhere from 1 to 2 years before we would offer a lease. That alternative is under serious consideration now both in my office in Denver and also back in Washington, not only the Bureau of Land Management office, but also the Department of Interior and I understand all the way to the White House. I don't have anything to report on to you right now, other than it is under serious consideration.

I mentioned what was happening in Colorado. We're talking about amending the White River Land Use Plan that is currently in operation. In Utah, Lloyd is presently

undertaking what we call a Resource Management Plan. Again oil shale under full multiple-use considerations in the decisionmaking process. Lloyd, I believe that decision will be made somewhere in 1987 is it?

Mr. Ferguson: 1984.

In Wyoming, that is where I got the year 1987, that is the year approximately that they will be making a decision in Wyoming to lease or not to lease.

I mentioned the last component of the oil shale program, and that is site-specific evaluations of proposals by private industry, and I used in my handout as an example the Chevron project. I just learned 2 days ago that that project will be delayed roughly 2 to 3 months. The reason is that getting baseline information from Chevron and for them to get it from the resulting consultants that they deal with has been exceptionally difficult, especially in the field of wildlife and socio-economic information. So it is going to take a bit longer to do that than they had anticipated.

I think this group should also know that we've been contacted by five major oil shale companies within the past 60 days. I know you're all concerned about Exxon's shutting down. I think we have to take each company and the management ability each one of those has on their own. I think that was brought to the forefront today by the White River folks. The one that I can share with you that has formally applied to the Bureau is Mobil. There are four or five other major companies who are in the negotiation stage with the BLM right now, and what will happen out of that I don't know right now and I don't think anybody knows, other than this, that there is sincere interest in the development of oil shale ultimately. What the timing is and what the production levels are of these companies no one really knows right now, but I think it is important when you're talking with your peers and when you're talking with other organizations to know that. So I think it is going to have an influence on the oil shale industry.

Do you have any questions at all on the schedule that I handed out or the timing?

MS. GRASSER: I was just wondering, you didn't talk much about the regulations that are part of the programmatic EIS. What is your schedule for the regulations and when does this group as a group get to see those regulations, and is that before or after they go public for review?

MR. LEOPOLD: Right now my understanding is this group will not see it before it does go public. Now this is something that perhaps Hank and I can sit down and talk about, if that is the desire of this group. I will fully consider it, but right now the answer would be no.

MS. GRASSER: For whatever it's worth, the National Park Service did have an opportunity to see the preliminary regulations, 6 weeks ago I think, and I would make the recommendation to this group that they may want to see that and have an opportunity to look at those regulations so that their input might get into the revised regs before they do go public, since this is an advisory group.

MR. LEOPOLD: I'll certainly consider it, that's a good point. I'll talk to Hank and see what we can work out on it. The regulations, I wouldn't call them a preliminary draft, I would almost use the word "Cro-Magnon" but that's not quite

true. They are the very essence of the beginning of a program. If you've ever been into development of any kind of regulations, they are very tedious, very time-consuming, and they require an awful lot of expertise at all levels of the organization. I would be happy to work with you and see what we can work out. We want to make the programmatic the essence of the program that we will be doing on the environmental impact statement concurrent with the regulations. We are still working on whether in fact they will be one document. I think the way we're looking at it right now is that they will be two separate documents, simply because we feel that it would be less confusing to the public if we go out and get different inputs, perhaps a week or so apart. I'm sure you concur after going through the four or five elements that I've tried to very quickly explain that the terminology is very confusing to the public. We're working very hard to try to get words, and get rid of much of the legalese that's in it, and trying to bring it down into a common man's understanding of the program. My personal belief is that once we get past the prototype program and get into what we now call the permanent program a lot of our technical problems of trying to explain it to the public will be eliminated. But it is extremely difficult right now for the public to understand that, and they are the folks that we have to deal with on a day-to-day basis. Any ideas along those lines that you have will be appreciated too.

DR. WILLARD: Why would you eliminate problems by going into the permanent program?

MR. LEOPOLD: Terminology, more than anything else now. If you will just look at the listing that I gave you, programmatic, they may be well understood by perhaps some of the folks in this room but the general public has a very difficult time understanding the words programmatic EIS, some of them have a hard time understanding what an EIS is and even the terminology. The word "prototype" is confusing in my judgment to the public. Perhaps the word we have chosen of "permanent" is difficult for them to understand.

DR. WILLARD: I wonder, then, if you shouldn't have more than 1 or 2 weeks between the EIS and the regs. I would think that more like 3 months would be more in order. One of the problems that people have is they have other jobs to do and they do their input to you on their off-time.

MR. LEOPOLD: I understand that. One of the things that we are trying to do is to get more time. We're looking at perhaps a period of 2 to 4 months' delay in the regulations to give people more time, exactly what you're saying.

DR. WILLARD: What's pushing you to make it so fast?

MR. LEOPOLD: What's pushing us? I don't have an answer for you, other than there is one person up in the Department, named Mr. Watt, on his "MBO" schedule that he has, those dates were decided approximately a year ago and there is a proposal on his desk right now, on Mr. Carruthers' desk and on Secretary Watt's desk to in essence delay for some very good reasons.

DR. WILLARD: Mr. Chairman, can we make a formal motion of this group?

MR. ASH: We're free, I guess, to say anything we want. However, we should keep in mind how this group's role is set up directly connected to the prototype program. We don't have by our charter any official role relative to such programs as we are

talking about. We have in the past when asked by an Assistant Secretary responded. We have reviewed and responded with advice or recommendations on various things, on the larger oil shale matters.

MR. LEOPOLD: Maybe you can consider that when I'm gone, tomorrow when you have a bit more time.

MR. BOEKER: Going back to your Chevron and Mobil proposals. Are those operations dependent on Federal lease land?

MR. LEOPOLD. Only in the sense that Mobil is going to require a right of way, portions of land which are now in existence for a reservoir, but there is one very, very minor exchange that would occur in the Mobil lease. It's very small. Mostly the major action would be a right of way on both Chevron and Mobil, and for that matter almost the land that is now presently either being bought or had previous rights by oil companies on the Roan Plateau.

MRS. LINKE: The final score really isn't in yet on the prototype program as far as the impacts and the environmental implications. Knowing that, how is the data gathered from the prototype program and the leases going to be melded into the decisionmaking for the long-term leasing program?

MR. LEOPOLD: That is an excellent question. One of the things that Pete Rutledge and our shop are trying to work out is that very question, and honestly we don't have it worked out yet. Pete right now, as perhaps some of you know, is short on a statistician to bring much of the data into a usable form that the decisionmakers can use. Right now there is an extremely large amount of information that we need synthesized so that we can use it. That's something that Pete and I have got to work out in the next several months. Much of it right now, Eric Hoffman and Pete have been actively working as a member of the team for the Prototype Environmental Impact Statement. So on a 1 to 1 basis they have been actively participating in that. So the bottom line is we have still got to work on it. We don't have it all worked out, and I would take that one step farther. Not only for the next stage of the prototype but right into the permanent program as well. The avenues are there to make that happen for the last 60 days about is what we've been working on.

Let me share a couple of other things with you, things that are going on in Colorado from the land use planning standpoint, that we've tried to get one jump on it in terms of putting a program together in Colorado. Many of you know that we've let several significant contracts, that we call inventories, for things that we see if the oil shale program is enacted that we need. No. 1 is wildlife. We've got a contract with the Wildlife Consortium which is made up of six universities in Colorado and we feel we can get valuable information from them. We have a significant contract out on air, on water, socioeconomics, cultural resources, rare and endangered plants and animals, and there are three or four minor ones that we have, transportation, energy balance, things like that. We feel this will allow us to do what I consider to be a very professional job in planning and designing how the oil shale will be managed in the Piceance Basin. I think in Utah they are beginning to do the same thing. They have many of the contracts that I have just read off also going on in Utah as well that will help the Vernal District Manager make more intelligent decisions on how to manage oil shale and for that matter, how to manage the multiple uses that are going in his particular district as well. In my judgment

also of significance to this group in Colorado is what we call the Cumulative Impacts Task Force that is headed up by Monte Pasco, the head of the Department of Natural Resources in Colorado. A similar effort is going on in Utah as well, but what this will allow us to do is to have a common data base for social and economic decisionmaking in Colorado. They will come out with a model that will not be the end-all to everything, but it will allow at least a common data base to be used by decisionmakers, whether it is at the local, State, Federal, or whether they be industry themselves, a common set of numbers that we can all begin to do our analyses from, and to me that is a major milestone that we've broken in Colorado. BLM has been a major supporter of that, although low-key, we have encouraged the effort. Recently we signed a contract with the U.S. Fish and Wildlife - a group called the Western Energy Land Use Team in Colorado, to digitize and to automate much of the resource, social and economic, and other basic information that is going on in the Piceance Basin. We should have, when we're done, I would call it the most sophisticated natural resource decisionmaking model available in Colorado, hopefully by the time that we have to make our decisions on oil shale, and if you would like to know more about the specifics of that model and what it means and how we're integrating it into the Colorado resource information system that the State has and other such similar situations, I'd be happy to talk to you about that at any time.

I think the thing I'd like to leave you with is that we need help in the decision-making process. I see this group as being an integral part of that. I think we've learned a lot from the prototype program and I don't want any of that information to be lost. I think the spirit that this group has in terms of being a part not only of the prototype, I hope you will look past that, I hope you are looking at a permanent program because we need the judgment which you have, in a creative fashion. So if you've got time before you go, I'd like to figure out how we can get better communications established between this group and Pete's shop and between our organization of the Bureau of Land Management. For I strongly feel that unless we begin to establish a balance between environmental groups, and I use that in the broadest context with social and economic and environmental design arts and the traditional values that we all think of in the environment, together, balance that with industry and what their needs are, we don't really have anything at all. We can't polarize, we have to bring together, that's the name of the game. Again, thank you for coming, if you have any more questions I'd be happy to answer them.

MR. WATSON. I have one question, Bob. I'm trying to determine the differences in the mission of your office in Denver and the Grand Junction activities of the now MMS. Is there any duplication there?

MR. LEOPOLD: Well in my judgment there's no duplication for they principally handle the postleasing responsibilities and we handle everything up to the post-leasing responsibilities. We thought it was important that we gain their expertise of what they've learned in postleasing on the prototype and vice versa. Pete, you might have something to say about that.

MR. RUTLEDGE: No, Clarke, I think the split's well established in the Secretarial Order, 1948 or whatever it is, it's a Secretarial Order. It works.

DR. WILLARD: Has this group already looked at these contracts that you mentioned that are leading into the permanent EIS?

MR. LEOPOLD: I do not know that. I don't believe they have.

MR. ASH: No, again Bettie, it relates back to what the Panel's role is, how it was established, and its standing and basically we're set up with the postleasing function as well as Pete's office in review of activities and plans on the prototype leases once they have been issued. We don't have any formal standing for this preleasing area of activities. We have in the past responded to requests from the Secretary's Office for review and advice on such matters, over broader policy matters than postleasing. We have not specifically been asked in this instance. We have offered our assistance to Washington in coordination with the Regional Oil Shale Team specifically. You may not be actually very familiar with that. It is a separate Advisory Group which really has a role in this preleasing, leasing policy, tract identification, and selection role. That is specifically their charter to do that, so we really have two separate roles and at this point we have not at least been brought formally into it. The Panel has been regularly briefed on what's happened over the past, really 2 years, of the planning and discussion of the additional leasing, and in fact for that purpose that we invited Bob here was to bring us up to date on what's happened, but we don't at this point have any specific role or request for advice.

DR. WILLARD: Have the two groups ever met together?

MR. LEOPOLD: The Regional Oil Shale Team has met two times that I recall; they have never met together.

MR. ASH: That is correct. There is some continuity of membership in that the Governors' representative on the Regional Oil Shale Team now they are also State members of our Panel. I'm not sure we have any of them here today or not. Jim Bradley is, right.

DR. WILLARD: How is the cumulative impact task force, what's the relationship of that to the Colorado Joint Review process, is there any relationship at all?

MR. LEOPOLD: Only very indirectly. The Colorado Joint Review Process is merely a function to try to expedite and get people to communicate on a particular project of significance. You will find that Chevron, we, the Bureau, hopefully some of the other Federal agencies will begin using the information that was just published, about 800 pages of socioeconomic data, by counties, by jurisdiction, and it goes all the way down to the water district, as a matter of fact. They use that information. There are 18 oil shale companies who are members of the Cumulative Impact Task Force, along with approximately 10 or 15 counties, Council of Governments, and the BLM right now is the only Federal member, we're kind of an Ad Hoc member, actually.

DR. WILLARD: Is it only socioeconomics?

MR. LEOPOLD: Yes.

MR. ASH: Thank you, Bob. We promised Bob that he could get away by about 4:30 p.m., he's got to be back in Denver. We do appreciate his coming over, and

Bettie, we will explore this further with Bob and with Washington as to how this Panel can better assist in what goes forward in this program.

DR WILLARD: It seems to me that in the spirit of the way this panel was established, to have some liaison and carryover and, perhaps, maybe the people in Washington aren't as familiar with how the whole thing got started as those who are out here in the field.

MR. ASH: Yes, we will pursue it. I have had some discussion with them earlier.

DR. WILLARD: It could be very preventive.

MS. GRASSER: Another point you might want to explore with them is what happens in between the Regional Oil Shale Team and this meeting? There appear to be lots of major pieces kind of happening in between the meetings of these two panels. For instance, I note that the contracts that Bob was talking about, one of which is the air quality contract, that entire contract was let and completed in less than a 3-week period. It is real difficult to believe that any kind of an adequate technical analysis can be done in that period of time when you're looking at prototype leasing on the scale that we are here. That is if it all happened after the Regional Oil Shale Team and will be completed before they meet again. Now I don't know about the other contracts but the air one was fairly significant. I think Bettie's question about what is pushing the time schedule so much is one that needs to be addressed and Bob alluded to the fact that there might be some schedule slippages finally being bought off on and I guess any details on that would be most welcome.

MR. ASH: We try to keep up to date on what's happening. We do have to, however, remain within our role as stated in the charter. If it is desirable, and the Panel's charter could always be changed, it could be modified to provide some of this. We have in the 8 years of the Panel's existence at times been busier than we wanted to be with things going on on the existing lease tracts. The current situation is not that busy, but we want to consider carefully, I think, before we bite off additional responsibilities. Lloyd.

MR. FERGUSON: Just to clarify a point. While the 3 weeks that were discussed with regards to the air quality contract, I think it is well to point out that was not the initial action that took place. That took place over a longer period of time than three weeks, and in fact, the contracts for air quality of a regional nature are an expansion of the work that was initially set up with the Uintah Basin air quality contract, it was an expansion of that to incorporate things into looking at things in Utah, Colorado, and Wyoming, within the oil shale region. I think the important thing too is that you recognize the difference, as you indicated several times, in the roles. This group was set up primarily for advice to the Secretary's Office, BLM, and Pete's office with regard to U-a and U-b, C-a and C-b, and that's it. And while there is a need for correlation and keeping things up to date that's all the charter allows for. Consequently, we would have been amiss were we to come to you with formal requests for advice without the concurrence and approval of the Secretary, which in essence would have been an amendment or a redrafting of the charter, so the other thing is to understand the makeup of the Regional Oil Shale Team, which has a formal charge to make recommendations to the Secretary with regard to the program as it's formulated, and while there is an extended period of time between meetings, perhaps there are a lot of things that go on in the interim and

there is communication between team members, and there is some consistency. I know I am at all the Regional Oil Shale Team meetings and Dewitt John is, he's at the other meetings with regard to things pertaining to that program as well as the representative from the Governor's office in Wyoming, and Jim, who's on this Panel is always at those meetings and so there is some correlation and tie between the two groups, but it is clearly a separation as far as the charter is concerned.

MR. ASH: Thank you, Lloyd.

MR. WATSON: Can I direct a couple of questions to Jim Godlove?

MR. ASH: Yes, I was going to propose that we go back to something that's clearly within our purview. I don't want to just cut this off because it's a good point and I think we should explore it and try to increase the communications and the coordination and offer whatever help we can to the Department and to BLM. Lloyd, to add to that too I would also say that if there are additional tracts leased under the prototype program, they would come under the purview of this Panel so we'd be back in the middle of the activities that we have gone through with the four existing tracts. And Clarke, relative to getting back to White River, let me say a couple of things on that. I think we can go ahead and take some time for some questions and comments right now, but I'd like to try and come back and using our workgroup structure with additional questions and comments or suggestions tomorrow. The idea is and that we have followed before, is for the workgroups to get together in the evening to night before our meeting all day tomorrow, to decide whether they want to make any formal recommendations or ask for specific questions. You all have the list of workgroup membership and we have some missing people. It seems that we have a number of Federal members missing. I don't know what the significance of that is. I hope they were not all laid off. But in some cases we have chairmen identified and in other cases we do not have chairman at this time of these work groups. Relative to the environmental monitoring plan, it seems to me that one, it does not deal specifically with socioeconomic matters, transportation, or rights of way, so I would separate those items out from consideration in this environmental monitoring, at least I don't believe there is any direct connection. So that leaves four workgroup areas that we would like to come back to tomorrow with questions and comments. Hal Boeker is chairman of the Wildlife Work Group. Anybody who wants to talk to Hal about wildlife matters that should be brought up tomorrow please do so. Carter Gibbs, next to Hal, is chairman of the Surface Disturbance and Rehab Group, the same goes for him. In the air quality area, however, our EPA member has normally chaired that group and I don't believe he has gotten here yet. We do hope he will be here tomorrow. And that leaves present today Mary Anne, subbing for Dick Strait, and Paul Ferraro for Colorado State. If you all have anything you feel should be brought up tomorrow, questions on the air quality part of that plan, please get together and decide, and then the last one is Water Supply and Quality, and our Chairman, Deborah Linke, is here. Deborah, I think everyone knows who you are, and we have some members on that workgroup who are new to the Panel and may not be familiar with how we work. Jim Bradley and John Donnell, and Paul Ferraro is also on that one. So if you will talk with Deborah, or Deborah, whatever you want to do. When we break anyone that wants to announce a work group get together, feel free to do so.

Now I want to turn back to any general questions or comments directed to Jim Godlove. Clarke Watson.

MR. WATSON: Yes. Jim, I'm just always sensitive to areas, potential areas of attack. In our presentation you had indicated that one of the problems that could be encountered would be terrestrial fauna, particularly small mammals, getting in some of the reclamation areas and doing considerable damage. What would be the methodology - do you have specific methodology for dealing with that sort of - ! (kill them!). Yes that's what I was thinking and there's a lot of potential controversy there.

MR. GODLOVE: Yes, Clarke, that's an area where we have a great deal of concern about. We have not done any research in this area within White River itself to identify a methodology to go about restricting the impacts of the smaller species on newly revegetated areas, but what we will be looking at are things like repellants, possible planting of species of vegetation around the perimeter of a revegetated plot which might restrict the movement of smaller animals into the main body of the plot. Possibly fencing, although I doubt very seriously if that would be very positive. I think all I can say here is that we have a concern, it needs some work, there may be a lot of things out in the literature there that we are not aware of at this point. I might mention that we have a very - all of the environmental monitoring by White River has been conducted by trained professional consultants, and they will be doing this work. In the terrestrial biology area we use Bioresources in Logan, Utah, and so they will be the ones who will be investigating this concern of ours.

MR. WATSON: My second question is do you have any tie-in - some of the things you described, particularly with regard to your monitoring air quality, it seems that it would be of particular interest to such institutions that are also federally supported and could benefit from this such as ENCAR and NOAA, is there any exchange of information or data that could actually go into the overall national data base?

MR. GODLOVE: Well none of our environmental data is proprietary, all of it is provided to the Oil Shale Office and it is accessible from the Oil Shale Office. Pete might want to address this aspect. As far as all of the data that White River collects from the environmental monitoring program.

MR. RUTLEDGE: Clarke, the water quality data is generally going into the USGS data base and the EPA quality program on tapes. The air quality is SAROAD format, not only is it stored by EPA but it is by us. The problem that the Math Stat brought up to further that program, right now we do have it all on tape, it's provided to Research. That is available. Just another thing you brought up, and I'm going to use it to make a little plug here. Without explaining Lagamorphs again! Small mammals and avifauna sampling is not unique to the prototype program. Everybody and his brother does it. What turned out to be unique to the prototype program is several qualified people questioning the methodology, the state-of-the-art methodology, and saying that you find out that populations crash and burn but can you really measure them with any degree of confidence that you could equate to development impacts. The answer to that was we weren't too sure, and we did through Don Dietz's help over there find some work going on at Battelle that was applicable under an existing contract. We worked with them and we do have a Phase 1 through, and the problem really is, okay guys, with all your knowledge and expertise and with all the methodology, design us a program that will work, at least on C-a and C-b and answer that. The first phase shows promise. Now if anybody around here has \$100,000 in

any Federal agency, State or whatever, that they could contribute to a worthy cause, not only for oil shale but also for all the rest of the development stuff that's doing that. It makes little sense to spend a lot of money to collect a lot of darned data that simply will not stand up in court, which is the ultimate test, because your peers cut it up, why do it? So we hope to finish that up and answer some questions in Colorado which would be applicable anywhere else. But I would suggest if anybody has an idea how the heck we can fund this thing, get in touch with Don Dietz. We're currently hustling BLM and I don't know how that is going to.

MR. ASH: Bettie?

DR. WILLARD: I don't know if you want to take some of my questions now or whether I should hold them till tomorrow. I am, as you anticipated, quite impressed with how this has been going on and I have quite a few curiosities more than anything.

MR. ASH: Go ahead.

DR. WILLARD: One of the things I am particularly interested in is how you are going to guide the analysis of cause and effect, because one of the really big problems in all ecosystems studies is to sort out, and of course what we find out when we really get to sorting out is that usually it isn't a single factor causing it, and we may have a prime factor and then there are a lot of secondary things and those may vary depending on the climatological or substrate, all kinds of different variables, and I'm wondering how you are handling that. I'm not trying to put you on the spot, I'm just curious because I have not been on the cutting edge of the state of the art for a while.

MR. GODLOVE: I'll tell you how I'm going to respond to that. I'm going to take a stab at it and then I want to turn it over to my experts, who should be able to respond to it better than I.

As I mentioned, you know, it's one thing to detect that a change has occurred. It's quite another thing to determine how that effect was caused. This is why pathway analysis is a very important aspect of our monitoring program. This is one of the reasons why our program doesn't just emphasize single parameters or single disciplines, because things very seldom manifest themselves in that manner, as you mentioned. This is why we are looking at, in addition to individual parameters, relationships among parameters, in addition to individual disciplines, relationships among the disciplines, and we hope that through this looking at the interrelatedness of the environment we can begin to home in on what is indeed the cause of a certain impact. We think that by having detailed information about how the plant is functioning, setting up our monitoring facilities in a manner that more or less lies along the pathway of expected impacts, we will be able to separate out the project-related changes from natural changes. Now that's my response. What I'd like to do here is to turn the mike over to Dr. John Carter. Dr. Carter is with Ecosystems Research Institute at Logan, Utah, and has to a great extent been responsible for developing White River Shale's environmental monitoring program. It certainly has not been my work, I've simply been supporting it and I think it is a viable way to proceed with monitoring. But Dr. Carter has really been the guiding light for us in this regard, so I'd like for him to maybe take a stab at this.

DR. CARTER: Well the basic philosophy we used was that you certainly can by conventional statistics detect that changes have occurred, and yet we didn't want to in trying to determine relationships that we could use to ultimately detect pathways of change have to investigate the entire ecosystem, which would require more money than we have available, than all the oil companies and everyone else could generate. So we knew that in the Uintah Basin certain types of relationships in general based on what we know of the ecosystem occur. Examples of that might be the relationship between precipitation and plant growth and how you can smooth out the variabilities in annual plant production or perennial plant production and the variability with precipitation through the months, weeks, and the years. Rather than testing those for their differences, if you combine the two and the relationships you get a very tight fit. And so you might be monitoring plant growth and detect a change and you might say that this change was abnormal, but then by looking at your overall relationships between plants and precipitation it's one that you would expect, and you can carry that line of reasoning through your expected pathway based on what we know of ecosystems and how plants respond to nutrients, how microbes cycle nutrients and how decomposition, litter fall, all these things are interrelated that is, you attempt to explain the change through the natural occurrence cause and effect by nature itself, and there are several steps in those pathways that can be impinged upon by oil shale development. For instance, within a plant itself you may have an effect from sulfur dioxide directly on the plant's chemistry itself and so that's something that you can measure by having established your baseline on plant chemistry and plant growth and also looking at the plant-precipitation relationship, so you have potential pathways you can look at that are tied back to the plant process emissions themselves, and of course with the plant process monitoring you are monitoring the levels of those things, and by comparing the rate of plant growth with say the precipitation relationship to the pH within the plant or whatever, the chlorophyll content, and also notice a consequent rise in sulphur dioxide levels above what they were when you measured prior, indicate that plant process emission might be the cause. Many of these relationships can't tell you with 100 percent certainty that that is the cause, all they can do is guide you to narrow it down so that then you have to investigate perhaps further in a particular area to actually tie it to plant process emissions. That's sort of the rationale we would attempt to follow. Does that help any?

MR. LUCAS: I'd like to ask a question, if I could. Will the postmining monitoring be related to the same pathways, baseline data, I'm thinking of postmining vegetation monitoring, to the baseline data you're establishing now?

MR. GODLOVE: Well we have established what I think to be a very competent baseline for the tract area. It is a lease requirement that we return the tract environment to as near a baseline condition as possible, so our monitoring will be directed at determining our success in achieving that postreclamation return to baseline conditions. I don't know if I'm answering your question.

MR. LUCAS: I think so. I was just wondering about the pathways you are identifying now if they are going to be viable in the new ecosystems you are going to establish during reclamation and revegetation. Where you'll be establishing new ecosystems - you're going to have a lake in certain areas, you're going to be planting different species I assume, if the principles you are using now are going to be viable then.

DR. CARTER: One of the concerns is that end land use can be identified I think and if the end land use is to restore the level of production of plant and animal

species, then that's what White River Shale is going to do. There may be differences in plant species composition but the object is to provide a food base for wildlife, and I think that's the ultimate goal. I think it would be difficult to go out and match species to species with the communities there now, particularly on the spent shale piles, so over the general area itself the object is to maintain productivity of plant and animal species, and within the general concept of the ecosystem there are similar pathways to follow regardless of the species.

DR. WILLARD: Could I follow up on that. Are you testing the plants you are going to use in the future to see if they are of the same nutrient level for wildlife and how they respond to it?

DR. CARTER: Well that is not my particular area. Dr. McKell with native plants would be able to answer that, but certainly the food value and nutritional value of the plants to be used in reclamation are a very important part of this consideration.

MR. ASH: Deborah.

MRS. LINKE: Because of the interest in salinity in the Colorado River Basin and the typically high solubilities of the materials surrounding the shale zone which will be disturbed, would you mind highlighting the monitoring sequence directed toward identifying salinity impacts particularly, and is salinity considered to be a "high priority" pollutant?

MR. GODLOVE: Well, Deborah, I think the way to respond to that is to say our hydrologic monitoring program involves looking at surface discharges and leachate in the plant area and also in the processed shale disposal area. We do intend to have a zero surface discharge facility, so in that regard we wouldn't expect to be releasing high salinity waters into the White River or into Evacuation Creek. When it comes to ground water of course our monitoring program will be looking on a regular basis at conductivity levels within our ground-water monitoring stations. So in that regard, yes, it is a high priority element of our monitoring system. But here again we do not expect to be discharging saline waters into the White River system because in addition to surface water containment we also have subsurface water containments which should prevent waters from entering the White River. Also, as Pete mentioned earlier on, we have some rather compelling evidence, it needs a little bit more work, that a properly reclaimed disposal area may indeed restrict it to the point of possibly preventing leachates from occurring and being transported down and possibly into the surface water system by some subsurface means. I don't know whether this responds to your question in the manner you wish, but possibly - we have our hydrological consultant here, Swayne Munson with VTN.

MRS. LINKE: I guess I understood that when you were having zero discharge and were reclaiming water and that sort of thing, but you're disturbing a lot of areas which are pretty highly soluble and I guess I was concerned because I couldn't tell from reading your monitoring plan whether or not in the White River this was considered a high priority kind of thing to be looking at. It takes a lot of money to take salinity out of the river and I was just really kind of interested in that particular aspect.

MR. RUTLEDGE: If it would help any, Deborah, from our standpoint as a regulatory agency the answer is yes, and that's both in terms of quantifying it, doing all that can be done to achieve a true zero discharge both surface and ground. Again a careful focusing on the bingo stone (?) as early warning, and then the routine monitoring in both downstream and the impoundments and also in the White River. Now all of the areas that are being disturbed, with the exception of the roads, would wind up in the drainage to be dammed by the runoff pond. So all of your mine plant, all those areas where there is significant rock disturbance, would be in that drainage area.

MR. GODLOVE: And the same holds true for the processed shale disposal areas. They will always be protected by a down-gradient impoundment.

MR. FERRARO: Some of the work that we've been doing on the cumulative environmental impact, the salinity impact is going to be from depletion, from what we can see, and I would just roughly say that based on the numbers they gave us this afternoon that they may have about a 2-milligram-per-liter increase in salinity at Imperial Dam, just due to depletion. We have to make the assumption they are not going to discharge any water and then the resultant increase in salinity will be somewhere in that order of magnitude.

MR. GODLOVE: I might also say that because White River's source of water is, at least up to this point, directly tied with the State of Utah's efforts to build the White River Dam, and the fact that the White River Dam has certain estimates related to its salinity impact down at Imperial, our project should not be additive to the White River Dam's impact, they should simply be a part of it.

MR. FERRARO: That's correct. It was calculated at one time that if the dam is going to be constructed and you're going to have a certain amount of water that's going to be depleted and the calculations of construction, of planning and then going in and constructing that, and that's already factored in, then I'd have to agree that we couldn't come along and say to count it twice. It was counted once and it's factored in, then I would have to agree with that. Some of the work I'll be talking about tomorrow on salinity, we're looking at, where you're taking water that isn't already factored into a reservoir. The other side of it is that if you take it from irrigated lands then you may be having a plus factor instead of a minus.

MR. ASH: Thank you. I think we'd better cut off the general questions for now, and then as I say, come back tomorrow to any of these matters. Most times when you go to a meeting out of town when the meeting is over in the afternoon that's when you go to "happy hour" and you relax and go out for dinner. Fortunately or unfortunately, this Panel was designed and chartered as a working panel, and as we only meet occasionally it is sometimes incumbent upon the members to work, even after the meeting. We have before us three things, to comment or to raise questions on tomorrow. One, the White River Development Monitoring Plan, which we've been talking about and which you might say a major item for that project. It is the first development monitoring plan, and people say, "we need help." Pete needs help, he wants any input from us that we can give him on that. He's got to review and approve that. Any of the work groups that want to meet this evening should make that known before we quit, but let me mention a couple of other things you have. Changes

in the monitoring plans for C-a and C-b, the two Colorado Lease tracts and I think that Pete's office has made our review of that much easier by virtue of putting together this sheet, this little comparison document which shows in the different environmental areas what's planned in the proposed, or approved in their basic monitoring plan and then what changes there are in this current interim one. So I think it makes it relatively easy for you all to focus in on the changes and raise any questions or make any comments you want tomorrow. I would hope you would take a look at this this evening as well as think about the White River Plan.

Now as long as we don't have a party scheduled tomorrow night, we are going to have tomorrow afternoon at 5 o'clock or a time to set up, for lack of a better word, we will call it a "happy hour" in one of the adjoining rooms here. I wanted to mention that to you. Deborah.

MRS. LINKE: I can see my whole work group over there shaking their heads violently, but optimist that I am could we get together for a couple of minutes right after this meeting.

MR. ASH: Carter.

MR. GIBBS: The same for the environmental group. Is this room going to be available tonight?

MR. ASH: I am not sure - Elanor says yes.

MR. GIBBS: If we could get together right after this for just a minute to decide what we're not going to do or do.

MR. ASH: And Hal.

MR. BOEKER: I think we ought to do the same thing and try to get together very briefly after this meeting.

MR. ASH: In my remarks earlier I suggested the other two work groups didn't need to meet. I certainly wouldn't want to stop them from meeting if they had something they wanted to get together and talk about, that is the socioeconomic and the transportation rights-of-way work groups. In connection with one of those work groups, Transportation, I'd like to introduce Pat Keyes, who came in this afternoon. Pat is the Panel member for the Department of Transportation and is the Secretary's regional representative in Kansas City. I guess you cover a wider area than that (Kansas City and Denver).

We have still before us the offer from Pete's office for Eric to give the new members and other interested parties a little update on the prototype program or briefing on it. I think perhaps with the work groups trying to get together we had better forego that this afternoon and, Eric, if time permits tomorrow, we might work it in tomorrow or is there interest in doing it this evening? Well the work groups all going to be working hard. Let's forego that and see if we can perhaps work it in tomorrow.

(Announcements of places to dine.)

Meeting recessed at 4:50 p.m.

MORNING SESSION OF THE OIL SHALE ENVIRONMENTAL
ADVISORY PANEL
May 12, 1982

Meeting called to order by Mr. Ash at 8:40 a.m.

MR. ASH: I would like to reconvene this thirty-fifth meeting of the Oil Shale Environmental Advisory Panel. I have some good news and some bad news this morning. The good news is that it is raining in Denver. The bad news is that the weather prevented the Synthetic Fuels Corporation representative from getting here. I got a call this morning and he's either weathered in Denver or weathered out of Denver and will not be able to make it. So I bring to you the apologies of Patrick Murphy and apologies from this office too for this event, but there's nothing we can do about it. That will presumably free up a little time this morning and at the first opportunity I would like to return to the comments on the White River Monitoring Plan. We'll just see how the time goes this morning for that.

The other thing I wanted to mention to encourage maximum representation this afternoon at the Happy Hour; there is a particular reason for this Happy Hour. One of Pete's staff members whom you all know and "love" is probably going to be leaving that office. It's not official yet but Roger Tucker will be leaving that office we expect before our next Panel meeting, and we wanted to take this opportunity to wish Roger Bon Voyage. I guess it's a "voyage" isn't it Roger? In any case, Roger can fill you in on where he's going.

The first thing we had on the agenda this morning were some comments from the Garfield County representative, and before I go farther, let me introduce the Panel members that are here this morning that were not here yesterday. Bill Geise from EPA; Bill, it's nice to have you here. Bill worked with the Oil Shale Task Force about 10 years ago and it's nice to have you back in the game, Bill. Mark Bubriski from Rio Blanco County, who will be the member from that county, and thirdly, Lee Merkel, who is the Energy Impact Coordinator from Garfield County. It took us about a year to get authorization to add Garfield County to representation on the Panel. It certainly has been clear that Garfield County has been impacted by the developments of the prototype program, and our charter was actually amended about a year ago and we will have as principal member from Garfield County Flaven Cerise, who is Chairman of the Garfield County Commissioners, and his alternate is Lee Merkel, who is with us this morning and will give us a few remarks from the Garfield County perspective. Lee.

MR. MERKEL: Thank you. I am going to make my comments brief. I don't have a lot to tell you that you probably don't already know. I would be glad to answer any questions anyone might have. Basically I have been on the job here in Garfield County as the Energy Impact Coordinator since last September.

Prior to that I worked with a couple of towns in the area, so I was familiar with the situation since 1978. And as you are probably familiar it's been since 1973 that we have been talking about leasing BLM property for oil shale development, and Arab oil embargo and what have you, and Garfield County and this region, Region 11, began preparing for the eventuality that we felt would occur from serious oil shale development, in addition to the other energy developments that have been in the area in the form of oil and gas drilling, coal development, and what-have-you. At any rate, each of the communities for the most part have been using State and Federal

monies as well as local matches to get the needed staff on board, develop comprehensive plans, capital improvement programs, begin some of their capital facilities additions so that they would be able to accommodate development from the C-a and C-b tracts in Rio Blanco County as well as the Union and Colony projects in Garfield County. Now we also have Chevron in the Joint Review Process, and Mobil entering and Union's expansion to 90,000 barrels per day from 10,000 barrels per day level, so we are involved in the constant continuation of the planning efforts, looking at what we need to do in the way of getting capital facilities and personnel on line in time to be able, with the necessary lead time, to be able to accommodate the influx of population and increased demand for services. With the two major projects in Garfield County that have been underway, Colony and Union, the county was faced with making some major decisions on those permits that were requested in 1980 and 1981. We have worked closely with industry and felt it has been a pretty positive relationship with most of the community impacts being taken care of through conditions of the permits and continuing good relationships with the companies so that they will continue to work with us and other government entities to mitigate impacts on a fairly informal basis. Of course the recent Colony news on their change in work force and operations level is going to have some significant effects which we are just beginning to assess now. We at this point don't have any detailed plan for decommissioning the project from Exxon Corporation. We have not really gotten detailed guidance as to what is going to happen to their plan of development that was to support their project, and we are basically waiting to meet with them in the next week or so to decide what our direction needs to be, where we are headed, and what kind of mitigation measures we need to take. I guess suddenly some of the chores of the County Impact Coordinator has changed from an influx of people to somewhat of a departure of some people. At any rate, that's basically where we are and I would be glad to answer any questions that you may have, and talk about Garfield County or anything else in the Region regarding oil shale

MR. BUBRISKI: Can you tell what numbers of workers are staying on, in anticipation of being picked up by Union or some other project like that?

MR. MERKEL: I think it's pretty safe to say we know a large number have left already, after 10 days, and probably a fairly significant number will remain in the area because they had intended to stay, they like the area, and there are some other opportunities with Union gearing up for this construction season. I don't know of any exact numbers, Mark, but I am just assuming that there is going to be a pretty significant number of people that are looking on the job market and changing situation with the housing availability, suddenly we won't have the pinch we thought we were going to have for housing availability, and the demand for services will change at a different rate but we haven't really begun to assess it.

MR. ASH: Any other questions for Lee from the Panel members? Pete.

MR. RUTLEDGE: When do you anticipate sitting down and getting some hard information out of Exxon?

MR. MERKEL: I would say within the next week or 10 days.

MR. ASH: Other questions or comments for Lee?

MR. DONNELL: Do you anticipate that the facilities at Battlement Mesa could possibly be utilized by personnel from the Chevron, Conoco, and possible Mobil in the future?

MR. MERKEL: Yes, I would say that there's a real good chance of that. Obviously, the facilities are already there in Battlement Mesa, some of the government entities are already set up in the form of water and sanitation districts. It is an area that has already been planned for growth and development so it would minimize the need for other new communities and different types of development strategies that will accommodate an influx of workers, and I would think that is a viable option that they've got. We don't really know at this point what their plans are.

MR. RUTLEDGE: Lee, has any decision been made to go ahead and complete the two schools? How is that affected?

MR. MERKEL: As I understand it, the elementary school and middle school are going on toward completion without any hitch. I spoke with Lawrence St. John yesterday and he said there's been no hesitation whatsoever on them. The high school at this point they had authorized the completion of the construction design phase and they are holding off on their plans for actual construction at this time. For those of you who may not be familiar, Union has contracted with the school district in Grand Valley and Parachute to build a middle school and Colony-Battlement Mesa was building the elementary and high school.

MR. FERRARO: Well doesn't Union, the type of workers they are looking for, aren't they more skilled than the mining? I thought I heard that last week, and that some of these people that have been laid off really don't have the skills they are looking for?

MR. MERKEL: I don't really know that, but I assume that that's the case since Union is farther along in their development of their project because of the different size and scheduling that they had. I would assume that that's the case, but I would think that there are probably still some of them that could be used and others that may still be here from the C-a and C-b decrease in work force levels but there may already be someone there to fill some of those skilled jobs that are going to be required on the Union project.

MR. ASH: Thank you, Lee, and welcome to the Panel.

Turning to the agenda, the next item is continuation of our review of the prototype projects with the first one scheduled this morning for Rio Blanco, and Pete Rutledge, do you want to introduce that?

MR. RUTLEDGE: Yes, Blaine Miller, President of Rio Blanco is here, and I will turn it over to him and whomever he may have.

MR. MILLER: Thank you, Pete. Larry Weiner, who is our Director of Planning and Economics will review our activities and plans for you. I came along to answer the easy questions. Larry or John Selters who is our General Manager for Tract Development, and Butch Slawson who is our Manager of Environmental Affairs will handle the difficult ones. So I will turn it over to Larry.

MR. WEINER: I last spoke to you on behalf of Rio Blanco at a meeting about 13 months ago in Denver, where we presented our plan for constructing and operating a Lurgi demonstration retort, and since that time a bunch of things have occurred. We completed our Modified In Situ Program and this we began in September 1977. We elected not to proceed directly with construction of the Lurgi surface retort

demonstration unit and we reevaluated our design approach to achieve commercial development on Tract C-a, and the first vugraph sort of summarizes what I want to discuss with you today. First I would like to review our MIS program. The OSEAP Panel has been involved in it since the beginning and we have never had a chance or opportunity to tell you the results we've had, and it really was a pretty tremendous technical success. Then I will discuss our planned 1982 mining and maintenance operations at Tract C-a, and following that I'd like to describe Rio Blanco's commercial development program which is currently under way.

One of the key objectives of the MIS program was to develop and test the mining and rubblizing techniques conceived by Rio Blanco. This was for creating a high void space for the MIS retort that would have a relatively uniform porosity distribution. Also our program is geared and designed to develop a technology base for commercial design and to assess the yield, cost, and environmental impact.

I will review our program by discussing our mine development, the retort preparation, how we ignited the retort, how we operated the whole system there, and then I'll summarize the results we had on the two retorts we had. When we started the first number was zero and the second retort was Retort No. 1 and I won't go into the reasons for that, and give you a summary of the results.

This is an illustration of the underground mine layout for the two MIS retorts, designated as 0 and 1, on Tract C-a. We had five vertical shafts, the production shaft, the exhaust shaft, the service escape shaft, oil shaft, and the instrument shaft. The instrument shaft is adjacent to Retort 1. And our biggest one is the 15-foot-diameter production shaft, and that was sunk using conventional shaft-sinking equipment. From this production shaft we had a single mine level, designated as "G" level at the bottom, and this was developed by just conventional mining drifting methods. The other shafts were raise-bored from the "G" level to the surface. And the "G" level is situated 850 feet below the surface and is a series of horizontal drifts which provide access to the bottom of the MIS retorts, and it is from this level both retorts were created. And after retort preparation, we installed bulkheads on the "G" level to seal the retorts, the production drifts, and the exhaust gas shaft from the other areas of the mine.

Because we have an underground aquifer, we had quite a dewatering effort which was necessary before we could proceed with the development, and this was accomplished by using a series of dewatering wells that we had around the area which substantially reduced the ground-water inflow. We had to supplement this with supplemental dewatering and we created another level called the Sub "E" level which was really a drainage gallery and from this level we drilled a series of drainage holes up into the aquifer and it did its job. It did allow us to drain the water so we could proceed with the mining. We collected this water and reinjected it into the aquifer at various points which the geotechnical people told us to put it so we would not have adverse effects on the surrounding streams and seeps.

I would now like to illustrate some of the conceptual aspects of the procedure that we used for creating MIS retorts. This was probably the most critical factor affecting the success of the MIS retort rubbling procedure. It was a unique rubbling method developed by Rio Blanco and a patent has been applied for, and this is not in the speech, but it was developed by Blaine Miller so besides answering the easy questions he did some extra work to help us out.

The first step in creating the retort is to drill blast holes down from the surface, to the full depth of the planned retort, and then we employed conventional mining techniques to excavate an undercut room at the bottom, as shown in yellow, across the full section of the retort.

The second step shown on the vugraph is to load explosives into the blast holes and detonate the explosives in a series of sequential shots to blast down segments of the roof into the undercut room. Part of the rubble is then removed and we left the remaining rubble in the room at its angle of repose, at its natural resting angle there, and we repeated this sequence of loading explosives, blasting down, and removing some of the rubble and we repeated it until enough oil shale was removed to create the void volume that we wanted for the given retort.

And the third step, shown in the next slide, was to continue the loading and blasting sequence, but without removing any more rubble. We kept blasting down until the chamber was completely formed to its full height and filled with the broken shale. And the next slide summarizes the advantages of this method. First, it is a simple design for economically creating retortable rubble. And second, the entire retort is created from a single level. And third, the blast holes used initially to create the retort were later used for retort ignition and to supply air and steam during the retorting operations. So Rio Blanco's retort preparation procedure produced a rubble that was relatively uniform in distribution of porosity and which has a high void space which results in a low pressure drop and fast retorting rates. It had a high sweep efficiency, but the main thing was we had high oil yield.

One of the major achievements that we feel that we had was the development of a very satisfactory retort ignition technology. The ignition procedure was to lower specially designed, gas-fueled, downhole burners through the blast holes that we used in the retort preparation and was lowered to the top of the retort as shown in the diagram over here. It was not necessary, and this is important, it was not necessary to develop a mine drift to insert these burners in here. The burners were commercially sized, they were retrievable, and they were reusable. And the ignition of Retort 1, and I use that as an example, was accomplished within 28 hours of startup. And we feel we could have had ignition sooner than 28 hours but we purposefully shut off the burners and reignited them several times to test it out and to give it sort of a light test and just to test the various reignition procedures. And we tested the operability and durability of the burners themselves. The burners achieved a very high heat flux with excess air which protected the burners within the borehole casings, yet it produced a fast localized combustion at the top of the retort, which is what we wanted.

And the next slide gives you several of the advantages that we felt we had with this procedure. The first ignition happened in a relatively short period of time, and we also determined that the survival of the attic space is not necessary for successful ignition. The burner fuel consumption was low because of the short startup time, and we feel that we fully demonstrated the safety aspects of doing it this way.

This is an illustration of a simplified block flow diagram of the process scheme for retorting at the tract. Again the same boreholes used to create the retort were used to feed air and steam to the retort. Gases were drawn to the surface by a compressor and oil and water were pumped from an underground separator room. In the development program the product gases were burned in a gas-fired incinerator, but

they were scrubbed before discharge to the stack, and then the flare was used for upset conditions and we've had plastic-lined ponds on the tract which were employed to evaporate the retort and scrubber waters. The Rio Blanco objectives were to maximize the retort front advance, and that was within the limits of the equipment we had, and it also consistent with safety requirements. And we had a front advance for Retort 0 which averaged 2.7 feet a day, and that excluded the air outages, and with portions of the run assessed at 4.6 feet a day. As for the second retort, Retort 1, we averaged 3 feet a day and we had brief periods as high as 7 feet a day, so we did achieve a maximum front advance there.

The next slide will summarize our Retort 0. That was our first retort and it was prepared the first half of 1980 and tested out beforehand at that time, and really the objective of this was to demonstrate our rubbling technology and see if our ignition system would work, see if our operating procedures were going to work, and there was sort of a smoke test for the surface ancillary facilities on the surface, to see that everything there was addressed. There was no internal instrumentation on this retort. This retort was about 30 feet square by 165 feet high, it was ignited in October, and it burned for 2 months and was completed in December 1980, and we predicted the maximum that we were going to be able to recover was 1,930 barrels. We actually produced 1,876, which was quite a high efficiency - that 1,930 was based on 100 percent sweep efficiency. This somehow proves to be more than we had anticipated, we really can't explain it, perhaps we retorted into part of the walls, and we don't have a satisfactory explanation of why we did so good, and that is sort of a unique switch. We are still investigating that. The second retort we'll summarize that in the next slide. An important part of this, this was prepared while the first retort was burning, at the same time, and was completed in January of 1981 and we had preburn testing conducted during the spring of '81. This one was semicommercial scale, it was pretty big. It was 60 feet square by 400 feet tall, and that's the tallest MIS retort ever built, and in contrast with the first one, this one was fully instrumented, we had about 150 thermocouples and pressure taps were placed at various levels. There was a separate shaft, an instrument shaft, was developed for this one. We ignited it in June 1981 and it burned until December 1981. Again, this preburn analysis predicted that we could get about 28,400 barrels, we actually produced 24,444 barrels, so we did pretty good on this one.

Let's sort of summarize our MIS program. This was a two-retort demonstration program. It confirmed that our retort rubbling was a viable design, and it offered economic advantages for producing retort rubble, and the rubble was of a pretty small average particle size, produced both in Retort 1 and Retort 0. We got the high void spaces that were desired, and this resulted in low pressure drops and fast retorting rates, high sweep efficiencies, and again we got the high oil yields. We confirmed that the blast holes that we used could later be used for retort ignition and then for supporting the burn with injection of air and steam. The advancement of retort ignition technology was also we believe a major accomplishment of our program, in that 28 hours we thought was a very good time considering that we were turning it on and off, and the main thing it proved was that we didn't have to develop another mine drift to the top of the retorts to ignite the retort. So Rio Blanco feels that we have demonstrated that the MIS retorting can successfully be conducted in an area of high ground water, with a carefully designed and implemented dewatering program.

Particularly significant again was that Retort 1 was prepared at the same time that Retort 0 was burning, and this increases our confidence that it will be possible to simultaneously conduct mining and retorting operations with a high degree of safety should this be used in a commercial operation.

In conclusion, Rio Blanco is very pleased with the results of our program. The MIS recovery may not be further pursued for Tract C-a development, since open pit mining and surface retorting which I'll get into shortly is our preferred development alternative. Nevertheless, we believe this MIS program indicates that our approach can be applicable to other properties where the oil shale is buried deeper than it is on our tract where we feel that open pit is the most viable way to go, and we are still analyzing the data on that. So that summarizes our MIS program, and I guess I could field questions on this at the end but John Selters is here and he lived with it day by day, this is part of his baby; he created and operated it and he will be able to satisfactorily answer any of your questions that are beyond me.

And with that I'd like to go on to the next slide and tell you about what we are planning for mining and maintenance at tract C-a in 1982, our current operation. Now that we have finished the MIS operation, we have gone into what we call the maintenance mode, the no operations occurring at the site. During the next few months we plan on mining about 4,000 tons of feed shale. Right now we are constructing a pilot plant for the process development unit, and we'll get into that in more detail later, at the Gulf Research Center in Harmerville, and we have to mine this shale as feed for it and this plan was submitted to Pete's office a few weeks ago. Subsequent to the mining, and conceived to be toward the end of the summer into the early fall, we'll be going into a nonaccessible standby mode. By this we mean we'll put pumps in the bottom of the mine for dewatering purposes but we are going to discontinue the mine ventilation. It won't be necessary to go into the mine for the foreseeable future. Meanwhile the retorts that were previously burned, Retort 1 is cooling by conduction. We plan on discontinuing monitoring; it was dropping originally by about 50 °F a month, and this will be part of our standby mode. However, if our plans change and we consider abandonment, we will present Pete with information that we are developing on abandonment and we would come into the Oil Shale Office with a plan for Pete's approval, prior to any abandonment. Meanwhile, environmental monitoring will continue for at least the foreseeable future and Butch Slawson, who was kind enough to work the slides for me, will talk about that program after I am finished.

I'd like to talk some about our sample mining that's going on. We currently have an approximately 12-man mining crew which will be augmented by a 6-man second shift for mining purposes, and the next slide will show you where we plan on mining. At the C-level we have an area called the PDU sample mining. This is a ramp that's being driven off C-level and it will extend approximately up to 500 feet through the Mahogany zone. The next slide shows a cross section, it is kind of in a northeast direction, it is hard to give you a view, in either of these slides, but there it shows it at C-level. From there we plan on sampling the entire Mahogany zone. In addition, we are going to take some sample ore from the existing levels in the R-6 and R-5 zones, and each blast is going to be segregated and marked for preliminary analysis and there will be ultimate analysis at the Research Center. We will continue this mining in the same way that we did the original mining; in other words, we have this same mining procedure, the safety, noise, and all other considerations will be in effect for this sample mining operation. In our postmining

operations, we plan on sinking submersible pumps at the bottom of the mine shaft for the sour water and the other water, and it will be operated from the surface. We will have storage on the surface, and this will be done prior to discontinuing the ventilation. Prior to this we will remove the equipment from the underground mine.

The next vugraph will give you a brief overview of the schedule for all of this, the timeframe, as discussed before, the cool down is continuous of course. We want to consider abandonment, the mining for the oil to be taking place immediately, continuing probably through the summer, through the fall, then removing the equipment and then beginning in '83 we'll have the nonaccessible mode, and meanwhile Butch will be doing all the monitoring under the approved scope of work.

Now I would like to start talking about where we are heading to on our commercial development plan. Again, although the MIS was a technical success with the high yield recovery, all of the technical and economic analyses indicate that open pit mining with surface retorting offers a greater economic and resource recovery advantage for Tract C-a than any other method. By open pit mining we estimate we would have available 5 billion barrels of oil on Tract C-a and recovering that would be consistent with the Code of Federal Regulations, stating that we should maximize the ultimate recovery of the resource. If we used the MIS technique the maximum we figure we would get would be about 2 billion barrels, and using the room-and-pillar technique with the surface retorting would only give us 1 billion barrels. So those are the figures we are comparing, the 5 versus the 2 versus the 1.

But the 5 billion barrels is predicated on us being able to dispose of waste material offtract as conceived originally by the prototype EIS, and with that respect in 1981 legislation was introduced into both Houses of Congress as part of various omnibus bills for offtract plant siting and disposal. Under 1 bill up to 10 sections of land would be available. This led us to base our commercial development on this method of development, open pit with offtract disposal. So during 1982 and continuing into 1983, our commercial development program is consisting of conceptual studies based on existing data. However, both technical and offtract uncertainties have to be resolved before we can proceed into a final design for any commercial decision. Because of the technical uncertainties we have instituted a data acquisition program. That is the terminology that we have called it, which when fulfilled, when we get the answer, will allow us to proceed with the commercial increment planning, and again, when Congress passes the offtract land bill and environmental studies are required, and we obtained the lease in hand, and these are some of the things that we predicate our future plans on that have to be resolved before we can confirm and establish a definite schedule for development of Tract C-a. The data acquisition program consists of the following, and I will go into a little detail on each of them. We have a R&D Program. One of the major things that we're doing is we're building the pilot plant, it's called a process development unit, we are using the acronym PDU, in the Gulf Research Center in Pennsylvania, and we are continuing now to evaluate the need for planning and performing a larger scale retort testing either ontract or offtract before proceeding into commercial development.

Now the R&D program, this was done mainly to support the development engineering and the detailed design, and we have major programs at the Gulf Research Center and the the Amoco Research Center. Gulf is in Pennsylvania and Amoco is in Naperville, Indiana. And it's in the area of retorting, upgrading and process support, and mainly the objectives are to improve certain aspects of the technology before

proceeding with a costly development program, and we want to determine the most effective methods for producing a refinery acceptable syncrude. The shale oils that we're using for the tests right now are from various sources that are available, and these tests will give us some preliminary data, and once we get some oil from our PDU we will be able to confirm this with the fresh shale oil, especially the Lurgi one, and Lurgi is the technology, I'll get more into that, that we have elected to develop. The details of our program are really proprietary, how we're going about doing it and it has been submitted to Pete's office in a confidential volume, but some of the nonconfidential and nonproprietary R&D studies that will be of interest to the Environmental Panel here, and that is one we are doing on toxicology. The focus on this year's toxicology program is really to gather enough information to protect our workers at the pilot plant, and in that we are doing acute oral and dermal toxicity; eye and skin irritation, and genetic tests, and we will be doing some pilot screening tests for longer term dermal and inhalation tests. The program for our commercial effort will begin in 1984.

We are doing some water-related studies on processed shale disposal and also processed shale moisturization studies. Those are based on existing material that we've had from the Lurgi Frankfort pilot test, and this is called old shale, these will be confirmed with the fresh spent or processed shale as we get it from the pilot plant. And some of the environmental research, Butch can give you more details, but we are continuing our experimental revegetation. We have three plots testing the long-term reclamation success. We have several studies that have been initiated on the wildlife habitat, reconstruction and enhancement, and we are building a simulated mine bench, we have a simulated mine bench experiment to develop methods to reduce postoperation time necessary before you can establish adequate habitat for livestock and wildlife, so we are looking to shorten the time, and mainly this experiment is focusing on water harvesting techniques to conserve and more efficiently utilize the natural precipitation. Then we have other ongoing habitat modification studies and these are to develop approaches for increasing deer habitat carrying capacity in the areas undisturbed by mining and the waste disposal.

I'd like to talk a little more about the Lurgi PDU Unit. Again, we picked Lurgi because of its anticipated high energy recovery and its processing efficiency. We've been doing process engineering on Lurgi since early 1980, and in doing that we recognized some opportunities to improve some of the existing retort-related technology. So in 1981 we elected to build this PDU or process development unit, as the most cost-effective way to obtain some of this information that we feel that we need and want to develop, and we also want this information mainly to reduce the risk and confirm a design basis prior to going into detailed design for either the commercial construction or even the demonstration plant on tract, and in order to get this thing off the ground as quickly as possible the decision was made and there was a hard choice evaluation as to where to build it, Tract C-a or Harmerville. But taking everything into consideration, we chose to go to Harmerville. One of the reasons was, and hopefully you can appreciate the fact that only internal Rio Blanco management approval was needed, so we feel we were able to get off the ground 6 to 9 months earlier than we normally would have, as we wanted to get the information as soon as possible. And we only had to modify very slightly the existing permits that they have in Harmerville, for they do have blanket permits, for all the research work that they're doing there, plus the fact we had skilled personnel on site there,

and laboratories which are built on site there, and there are all kinds of computer facilities and other support facilities, there are other process development units that were being built and we would have the experience of those people for answering questions. Another and almost overriding consideration was that construction and operating costs were projected to be much lower for Harmerville than in a remote area such as Tract C-a. So those are some of the overriding reasons or I should say necessitated that we take into account when we elected to build at Harmerville. I think the speed, lower cost, and it just got off the ground in a very short time, and we elected to go into it last year and started construction last September. We enclosed the housing in the first quarter of 1982, and we feel that we will be in operation close to the middle of next year, so there will be less than a 2-year period.

The next slide shows you a sort of a flow diagram of the Lurgi PDU. I won't go into the details, we have done that before on the Lurgi, but mainly it is an indirect heated process, it's retorted in the screw mixer area and the heat medium is the spent shale, there's a closed lift pipe there, and the spent shale goes up the lift pipe on the left and the carbon is burned off, it gets it up to the high temperature needed, and then it's fed right back with the fresh shale, and all the other things, the cyclones and all, they are just to keep the things moving freely and to get off the dust and so on, but the main thing is it is sort of a closed loop, the hot spent shale is mixed with the fresh feed shale. And the next slide will give you sort of a schedule of part of the operation that I just told you about, R&D is almost forever ongoing but we want to get the basic data, starting in 1982 getting into 1983 summer-fall of 1984, this is information we need to feed into our conceptual design. The PDU as we said, we will be feeding the shale, the feed shale will be mined this summer and sent to Harmerville, and go into operation toward the middle of 1983. It is planned as a 3-year operation, and we supplied Pete with more data than I can give you here, the year by year plan and some of the specs on the unit itself.

Now I have talked a little about the demo unit. We elected not to go with the original one; it just was not a cost-effective way to go about doing things. You have been hearing about costs recently, and it is a dominant thought in our minds. It has to be effective for what you spend to get the information. So during this next year, 1982, and perhaps going into 1983, we are going to be investigating the necessity of demonstrating the process operability and workability on a larger scale than the PDU. But the PDU is a once-applied demonstration unit and the question is do we need something bigger to demonstrate it before you go into the first commercial increment, whatever size that will be. That's another thing that we are trying to determine. So this will be part of the investigation, there will be engineering analysis, there might be some R&D information feeding into it, and mainly we have to determine the risk of scaling up, before going into a commercial phase. Shall we go direct or is it more beneficial to do some larger scale testing retorts. Again we don't have the answers now, we have to make that decision internally.

And the last part of what we'll be doing is this conceptual engineering. That runs into the remainder of 1982 and 1983, we have a program based on existing data. Right now we started with developing what we call a reference case. We've got to pick something to start with, this a reference, it will be a certain size, we will develop an order of magnitude cost estimate. Whether this is the right size to start with we don't know. We have to start feeding in the data that we get from the PDU, from the R&D program, and we have to optimize. We talk about as the chemical

engineers do, whether it will be upstream or downstream, what's the right size for upgrading, does that match up with the size we picked for retorting, and this has to be balanced out. We don't know whether a 10,000 barrels per day module is the right size, should it be 50,000 barrels, or is it something in between, is the scale-up factor really going to work, do you save money when you scale up to the old six-tenths power, like the textbooks say, is this the state-of-the-art technology? This is what we're doing in our conceptual engineering. We can go only so far until that offtract land bugaboo hits us. We can't do site-specific design until you have a site, so really until we get a lease in hand we don't know where our offtract land will be, where our plant siting will be. So we can only go so far with the conceptual engineering, especially in the mining effort and partly in the processing until we need this offtract legislation. I guess you can do it, but it surely would be imprudent and potentially wasteful of quite a bit of bucks if you guessed wrong, and that has to be taken into consideration.

And the last slide I have shows you what is representative of this thing. I can take you until we get through our conceptual engineering and then we hit a point where the offtract design is essential; however, keep in mind that we do need technical guidance from the R&D program and the PDU would also feed into that, so we can go ahead with the preliminary and detailed design. And with that, I have sort of shot my wad of what I had to say, to try to tell you the successful results we had with the MIS. That was the method that we elected to go with the first offtract land thing first bit, but that is not the best way to develop our tract. I have given you the plans of how we plan to go ahead with development, the conceptual design, the R&D program, and taking the offtract legislation into account, and I'd sure be glad to answer any questions you have, or you can shoot them at Blaine or John Selters. I've sort of talked myself out.

MR. HANSEN: I guess I don't really have a picture of the economics under commercial development of the MIS. Would the retort be designed to the full thickness of the ore zone, and would it be possible to place them back to back or side to side, or do you have to leave a pillar in between or a membrane of some kind of shale?

MR. WEINER: I'm going to shoot that back to John Selters.

MR. SELTERS: We have looked at a couple of extensions from what we've learned so far in our program and we feel like we might be able to get up in the order of 600- or 700-foot-high retorts. That's an extrapolation from our current 400-foot experience. But in any case you will have to leave extensive pillars around the retorts, underneath and below them and above them of course, and you end up with a net recovery somewhere around the order of 20 percent of the resource. So for several reasons we are not able to fully exploit all of the shale resource there. Does that answer your question?

MR. HANSEN: Yes.

MR. WRIGHT: What was the cost of the MIS program to date?

MR. SELTERS: \$132 million, and we got 16, 18, what was that total balance that we recovered? 26,000 barrels or whatever. In dollars per barrel it would not be attractive.

MR. WRIGHT: I don't understand now exactly what you plan to do now with this MIS. Are you now saying you're not going to use it? (That's right.) You've experimented with it and proved it but you've decided it isn't something you are going to use commercially?

MR. BLAINE MILLER: It's still of interest. The economics are reasonably comparable as between open pit mining and surface retorting and modified in situ retorting. The main driving force is resource recovery. It is a multiple 2 billion barrels with modified in situ, 5 billion barrels by open mining and surface retorting, and we just feel that it is foolish from our standpoint, from the country's standpoint, from any standpoint that you want to look at it, to waste that much resource. That is the real driving force for the open pit mining and surface retorting, is resource recovery. There are other aspects that enter into it as well. Technical certainty. We feel that surface retorting is further advanced than is the modified in situ, and we're just more certain of the technology involved.

MR. WRIGHT: What's the maximum depth you could use your MIS procedure?

MR. MILLER: The only limit that I can think of would be how deep you could drill a hole from the surface with reasonable certainty as to where it is going to wind up, drill a reasonably straight hole from the surface and you could get away from that by putting an intermediate mining level and do your drilling from that, so I don't think there would be any restriction on the depth.

MR. WRIGHT: Can you recover that many more barrels per day going, I assume open pit. For example 50,000 barrels a day on the MIS, could you get 150,000 with open pit?

MR. MILLER: Yes. There is also the producing rate, potential, for the tract that enters into the equation. Our best estimate is that the resource underlying Tract C-a could sustain as much 300,000 barrels a day with open pit mining and surface retorting. From modified in situ the maximum that we could visualize getting to is about 100,000 barrels a day, and both of those would require an enormous investment and an enormous plant, bigger than anything you can really see today anyway.

MR. WRIGHT: And the cost per barrel is comparable, is what you're saying?

MR. MILLER: Reasonably comparable. We're still working with that in refining our estimates but there is not a tremendous differential, no.

MR. BUBRISKI: Could I ask a couple of questions, as long as you're up. No. 1, I was just wondering what Rio Blanco feels their prospects are for obtaining offtract land at this point would be and when you think that decision might be, and secondly, we're wondering how many tons you either are hauling or will plan to be hauling from the tract in Piceance Creek eventually to Pennsylvania, and the second part of that was some assessment of what that might be doing to Piceance Creek road and some of the other roads in the immediate area. And I guess the third question, which is somewhat parochial, but I've been asked during the last few days concerning the recent announcement of your closing of the community development office in Meeker. I have been approached and people are asking what does that mean in terms of what Rio Blanco Oil Shale activity may or may not be over the future. Can you address any or all of those?

MR. MILLER: Sure. The first one is about the offtract land bill. I refuse to be optimistic about that. We've been working on it for 7 years and honestly I cannot identify anyone, anywhere, that is opposed to the legislation to get Tract C-a something that was essentially promised to them when we bought the lease. The EIS described the various alternatives for offtract lands, described how we would get the land, and it wasn't until after the sale that the Assistant Solicitor for the Department of the Interior concluded that the authority didn't exist and that special legislation would be required. There have been more than five bills introduced into Congress. The most recent version, the Marriott-Santini bill passed the House several months ago by a 408 to 5 vote, I believe, it was something on that order anyway. And this is more than an offtract land bill; it's an omnibus leasing bill, there are other provisions in it, but at least that takes care of our problem if it's passed. A comparable bill, Warner, Senators Warner and McClure introduced in the Senate, that passed the Senate Energy Committee several months ago, and it is now stymied waiting to come to the floor and I have no notion when and if that will ever come to the floor. But this is further along than we've ever been in the past, and we're still hopeful, but as I say I refuse to be optimistic until we see it on the President's desk and after he's signed it.

The second thing was, I think, how many tons of ore we would be shipping to Pennsylvania. Approximately 2,000. It's about half of what would be mined in this incline that goes through the Mahogany zone. We haven't yet determined how that will be shipped. Economically it seems to be a wash as between truck and train. When we conclude that, then of course we'll have to assess what effect that will have on roads in the area.

The third question was on the closing of our Meeker Public Affairs Office. Yes, we do intend to do that, whenever we feel that it is no longer serving a real useful purpose. As you know, Carolyn Hubble has been there for some time and Lenore Etcheverry is there also and they are doing a great job for us and I think the people in the area have appreciated having them there. But with the reduced activity at the tract, which will be minimal over the next few years, we are really just on a maintenance basis, but we don't feel it is really worth our time to have that office there, and once we gear back up and start some activity we would certainly plan on reopening that office and in fact we have always looked very seriously we haven't made a decision of course but look very seriously at moving the Rio Blanco Office to the Western Slope whenever we really get into a construction mode, and I personally have always felt that would be at Tract C-a, that our main office would be at Tract C-a once we get into the construction mode. I hope that addresses the three questions.

MR. WRIGHT: What's the maximum depth that the resource can be at for you to mine it through an open pit method?

MR. MILLER: It's really a combination of the amount of overburden, the amount of material that overlies the resource, the nonresource material overlying the resource, and then the thickness of the resource, and it depends also on the value of whatever that is that you're mining, but I think generally if you're going to use a rule of thumb it would be a stripping ratio of about 1:1. In other words, you couldn't remove more than the amount of material that you're going to eventually mine as ore. If you had a 500-foot resource perhaps you could strip 500 feet of overburden. In our case, it is considerably less than that, it's averaging about 450, and the resource about 1,100. It's considerably less than 1:1.

DR. WILLARD: This 20 percent. Is there any way you can increase that in the MIS process by getting the retorts closer together or anything else?

MR. MILLER: There are possibilities but they're only that at this point in time. One of the things that we've been investigating is the possibility of taking about - well let's go back a little bit. The spent shale out of the Lurgi retort is like face powder, very, very fine, and it has some cementing qualities to it, and we are investigating the possibility of slurring that Lurgi spent shale, pumping it back into the burned-out retort, making them essentially pillars, making the old retorts new pillars and the old pillars new retorts, and then potentially you could substantially increase the recovery that way. But that at this point in time is a dream.

DR. WILLARD: What percentage are you able to remove through the Lurgi process itself, or do you know yet, since you haven't got the retort going?

MR. MILLER: The percent recovery by a Lurgi retort? It would be essentially 100 percent of Fisher assay, and Fisher assay isn't 100 percent of what's there, it's just a standard, a standard very small scale laboratory retort, but it's quite efficient if you can match that recovery then you're doing extremely well. Most of the surface retorts will be very close to that 100 percent of Fisher assay.

DR. WILLARD: Are we going to hear some more about what the environmental problems, especially air pollution problems and toxicology problems are over the Lurgi?

MR. MILLER: Yes m'am.

DR. WILLARD: Well I was curious, you must have some idea though what the Fisher standard is. Is it 50 percent removal, 75 percent, 100 percent?

MR. MILLER: No, Fisher assay, it's possible to get about 140 percent - Pete, is that a reasonable number or something like that of Fisher assay? If you had a process that was 100 percent efficient it's something in that order.

MR. RUTLEDGE: I hate to do it, Bettie, but basically the Fisher assay drives off under 900 °F atmospheric pressure all the oil you can get out of that shale. Now if you do it under hydrogen and start converting some of the remaining carbon you can get more. Fisher assay is no more and no less than a gold assay. In a good smelter sometimes you can get more than 100 percent of gold assay. Remember out of most processes you're getting about all the oil that can be driven off. You leave some coke and carbon on the spent shale. Lurgi would use that for heat. So all Fisher is is an arbitrary assay, it's about the best you're going to do unless you go to extraordinarily high pressure or hydrogen retorting conditions or something like that.

MR. MILLER: It would be possible with a very efficient process instead of recovering gas as you do in the Fisher assay is to recover that as a liquid, it is possible to get better than that.

MR. WATSON: I might have understood the numbers wrong, but to be commercially feasible don't you have to average around 25 gallons per ton in terms of resource recovery? The reason I ask the question is because the numbers Larry presented show around 17.3 gallons per ton for the 0 retort and about 21.6 for Retort 1.

MR. MILLER: Well as your Fisher assay of the ore increases, then your percentage recovery normally increases as well, in modified in situ. The fact is, if you recover - well we recovered 68 percent in our retorts, 68 percent of Fisher assay. If that gallons per tonnage had been up higher, and we operated exactly the same way, we would have gotten a higher percentage recovery. Yes, there is some cutoff point below which you don't have that process at all, but there's no magic number I don't think, Clarke. In fact, on an open pit mine our ore that would be fed to a Lurgi retort would average about 21 gallons per ton, something like that.

MR. WATSON: With respect to the open pit mine, you certainly have my permission to proceed.

MR. MILLER: We appreciate that.

MR. DONNELL: May I ask a question. As you have indicated, you've been waiting 7 years to get favorable legislation for offtract disposal. How much longer do you wait before you make a decision as to how you proceed? It may be another 7 years before Congress moves on this. You presumably cannot afford to wait that long before you decide whether to go back to MIS, which I presume you might be comfortable with after the results that you've had. It might not be the preferable method but you would be comfortable with it. But when do you decide to maybe give up on legislation and go ahead with some sort of MIS approach?

MR. MILLER: Well one thing, I said the economics weren't terribly different, but the economics of the open pit with surface retorting are better from what we know now than with modified in situ, and I think you can see from the announcements that have been made here recently that even if you utilize the most efficient method that you can, you're still dealing with a marginal project. It wouldn't be too bad if these were \$5 and \$10 million projects, but they're not. They are huge things. You look at the cost estimates that are coming out in the news media on the Colony Project. Exxon said, and there are different opinions, but Exxon says somewhere between \$5 and \$6 billion and perhaps more. You can buy the entire Gulf Oil Corporation for \$6 billion. Two hundred million shares at \$30 a share, that's half of the total partnership of Rio Blanco, it's a huge project so it doesn't make any sense when you've got a marginal project to start with to say we are going to accept a lesser method of going about this, a less efficient method, a less economical method, and I can't answer your question because I don't know. I would be happy to answer it; I wish I did know the answer, but it may very well be that if we can't, if we're not allowed by the Government to proceed with the most efficient method, we'd give up before we'd go to something that has a smaller chance of being successful.

MR. DONNELL: Okay, now I'd like to ask you about the Lurgi retort. Up until now, as I understand it, it has been used mostly for processing coal rather than oil shale, and it's only been used at a bench scale for the processing of oil shale. Now you might run into unanticipated problems trying to scale up with the Lurgi retort. Do you have an alternative method for surface retorting if the Lurgi does not work out?

MR. MILLER: No. Both Gulf and Standard, of course, as I have seen all of the oil companies are, are looking at other second, third generation type of recovery mechanisms, but the Lurgi unit, you're right, it has been used mainly at large scale for coal devolatilization, but the component parts have been tested at fairly large scale on other applications, mainly coal. The largest unit that I know of that's

been operated on shale is the pilot plant in Frankfurt, Germany, which is 25 tons a day, and yes, there are scale-up concerns associated with that, but I think that's true of all technologies.

MR. DONNELL: Some of these, though, have been used on a pilot scale up to 1,000 tons or a 1,000 barrels a day, and it proved out at that scale, which is a quantum jump from what you're talking about with respect to the Lurgi. I'm not pushing another type retort, I'm just saying you might run into some sort of an impasse and do you have a place to jump in case you do? You don't want to end up with a dead end, committed to one type of retort, that's all.

MR. MILLER: No, we don't have a second technology, if we run into some fatal flaw on Lurgi, that we immediately jump to Paraho or Union or whatever.

MR. ASH: Thank you, Blaine and Rio Blanco staff. We probably should move on to the discussion of the environmental monitoring scope of work changes. Dr. Slawson.

DR. SLAWSON: As Larry outlined, Rio Blanco has been in a transition as we completed the second in situ retort burn late in 1981 and at that time we also initiated internally within Rio Blanco and then in discussions with the Oil Shale Office some discussions of modifications of the environmental monitoring program. As Larry indicated, we've been dealing somewhat with a moving target, and we proposed early this year some modifications of the monitoring program that were, we thought, appropriate for the initial cool-down period and the initial mine maintenance period that we are now into on Tract C-a. The main basis for the modification obviously we were completing the MIS burns and the level of activities on Tract C-a and related to that the air emissions, for example, were going to be declining significantly, in this case effectively going to zero. So we initiated these evaluations and early in 1982 proposed some modifications to the Oil Shale Office and then with meetings with the technical staff there we came to agreement, and the modifications that were proposed for this initial period of the mine maintenance period were approved in early April. I'll go through what the modifications entailed, and do the air studies first. The air studies program during the MIS burn included two full air quality and meteorology stations which were designated Stations 1 and 3. Site 2 is a meteorological station to the south and west of the tract basically and includes just meteorological parameters and suspended particulates monitoring. The modifications that were approved included the decommissioning of Met Site 3, which is the full air quality met site, essentially to the east of Tract C-a. The rationale for that being that with the completion of the MIS burn and basically buttoning up the system that there would be no more gaseous emissions, sulphur oxides, from the operation. We are maintaining at that site to the east of the tract a suspended particulates monitoring station, the rationale there being there is still traffic on Tract C-a and during this period there is a low level of mining activity that does generate some dust and so the particulates monitoring at Site 3 continues. Site 1, which is the other fully instrumented air quality site, is being maintained at this time. We feel that decommissioning site 3, and keeping site 1 should provide us with better data recovery because the instrumentation is identical in both stations and if, for example, we had an instrument failure at site 1 we could just unplug an instrument at site 3 and take it up the hill and put it in at site 1. So rather than having to go through repair, servicing type scenario that could take several days this would be very short lived in any outage.

Part of the agreement, at this point, is to at some point prior to commercial construction on Tract C-a that we would develop an additional initially suspended particulates and ultimately a full air quality site, roughly at some point downwind from the process plant and the disposal area, wherever that turns out to be. Several other elements of the air quality program, in addition to these met sites, such as the visibility program is continuing in cooperation with Tract C-b, and we are participating with the American Petroleum Institute and some other organizations to try to develop some other monitoring and evaluation programs relative to air quality, one of those being API seems to be moving in the direction to establish an acid rain monitoring site in the Flattops area. We participate through API and are pushing them in that direction. In addition, the Department of Energy, EPA, and other agencies from time to time conduct various research tests in the oil shale region and we will be cooperating or working with those groups to again further our knowledge of the meteorology predominantly, to allow better prediction of dispersion and air quality impacts for commercial development. This fits in in many ways with the change in direction that Larry noted, which is moving toward essentially an R&D type focus on things to develop the data that we will need for commercial development.

In the terrestrial ecology studies we've had a series of efforts dealing with not only background characterization in the aquatic ecology area, but also some studies that were specifically oriented toward detecting impacts. We've made several changes as listed here in the terrestrial ecology studies. The color infrared, the CIR photography program was largely oriented toward not only vegetation mapping but also to indicate, as an indication of plant stress due to SO_2 or other emissions from the MIS operation. Since the operation is over and we have taken photography through the preburn and during the burn period, we anticipate no stress factors from the operations in the near future, and so we've deferred the CIR photography work until just prior to commercial development on tract. Even though in several cases here we're deferring work or we're discontinuing certain activities with the CIR and virtually all the other studies, we will continue to evaluate the state of the art with monitoring technologies, either remote sensing technologies such as CIR or other sampling data evaluation methods so that we will be able to design a monitoring program appropriate to the commercial activities which will allow us to successfully keep track of those operations on the environmental side.

The soils work, the change there was really a clarification. Soils work was planned as a monitoring tool, and as looking at probable impact areas and basically the scope modifications were a clarification of what was in the scope of work written last year to tie this work to commercial operations on tract. The feral horse surveys in the past have been conducted using helicopters. However, this program has been discontinued at this time because of the low level of activity on tract and obviously the low level potential for any impacts in this regard, as well as the success of the BLM roundup programs which have significantly reduced the feral horse population in our area.

We've discontinued the avifauna or the bird surveys during the mine maintenance, the interim period here. The Oil Shale Office is continuing an investigation of cost effectiveness of various monitoring programs dealing with avifauna as well as other components of the terrestrial ecosystem to try to, again to develop approaches which will be appropriate for commercial development. In a similar way we have discontinued the small mammal surveys at this time. However, Battelle Northwest Laboratories

are to be conducting, I don't know if they have the contract yet, some small mammal sampling looking at sampling methodologies and various approaches to looking at the small mammal populations. We will be providing personnel and other support to their field activities near Tract C-a.

The hydrology program because of its complexity is a little more difficult to get on one slide, so I've put some generalizations about the types of changes that were made in the hydrology program. Due to the decreasing activity on tract, we have shifted predominantly the sampling frequency for water chemistry and for the water level monitoring. The system has fairly well stabilized with the dewatering program and there's not a lot of additional activity anticipated as far as additional perturbations of the hydrologic systems on Tract C-a. We've shifted the chemistry sampling which ran anywhere from weekly sampling up through annual sampling depending on the site. We've shifted that program to one which is predominantly a quarterly sampling program with trace constituents being monitored annually. Again because the system is stabilized and activities are decreasing, we have decreased the frequency of the water level monitoring in the various wells around Tract C-a. For example, we had a program which included weekly sampling at many wells and we've basically shifted that program in the deep aquifers to a quarterly monitoring program, again because the system is stabilized and there's not a lot of change anticipated as far as, for example, changes in the dewatering program, the cone of depression. One thing that has been a periodic problem in our monitoring program and in dealing with our data is that occasionally we get blips, if you will, in our water level data related to oil and gas drilling operations. So we've initiated a program which during drilling operations while oil and gas people are going down through the two aquifers underlying Tract C-a we sample on a daily basis at one or two selected wells very close to that site just to keep track of that operation to see if we're having any difficulties or any perturbations due to those oil and gas drilling operations.

That fairly well summarizes the hydrology program, although there's not a lot of detail there admittedly. The aquatic ecology program which has included sampling of benthos, paraphyton, and water chemistry and various physical parameters at selected stations down through the Corral Gulch, Yellow Creek, and White River drainages has been modified to discontinue the sampling in the White River and we justified this based on the fact that with the low level of activities we don't anticipate that any significant discharges, the dewatering system only discharges at the surface during upset conditions, pump maintenance, or reinjection line breaking or something like that, very short-time episodes, and in addition we have a package sewage treatment plant which right now is putting out about 2 to 3 gallons per minute. So the effects on the surface on the aquatic ecology are certainly nominal during this upcoming period and so we've cut back any monitoring in the White River because nothing that we will be doing will have any effect that far downstream.

The subsidence monitoring program was discontinued. However, we will maintain the survey monuments so that in the future if it's ever deemed necessary we could go in and continue those surveys. As Larry indicated, we're going through a transition and changing the focus of our program on the engineering side and on the general R&D side. In a similar fashion we're changing much of the focus on the environmental program. The ontract activities are continuing to decline and will continue to decline through this year, and we will be continuing to evaluate our monitoring needs relative to the level of those activities. We will be stressing over the

upcoming period various R&D programs related to the PDU development which would include characterization of off-gas and various liquid or other waste streams as well as the continuation of our toxicology program. We've initiated on tract several activities, basically research activities related to reclamation, revegetation, habitat mitigation problems and those will continue, so we are going from a transition of operations or impacts monitoring which has been the focus over the last year or two with the MIS operations to a mode where the focus is on these commercial planning operations and various research activities. That basically summarizes where we're at.

MR. ASH: Thank you. Pete maybe we should put this in context a little bit as to the status of it and the scope of work monitoring plan you have been operating under which was tied to the, as I recall, a modular development phase and if you would just put it in context, Pete, from your standpoint and the status of the changes.

MR. RUTLEDGE: I guess I better talk about what is before the Oil Shale Office for approval, and one thing I'd like to have because it was brought up, at least I want to say what is not before us first. What is not before us at this time is the abandonment, permanent abandonment of the MIS mine or retorts on Tract C-a. That is the subject of a lot of debate still on how we're going to do it and what can be expected and what kind of schemes, and I know Butch has promised me all sorts of good stuff on that, but that issue is not currently before us. That would be a major issue that would come to the Panel for debate and I consider that would take up considerable debate before a final cut was made on that. What is before us are two items. One, the approval, or it really was approved, it was approved subject to the Panel's comments, that is any comments with regard to what we will call the interim Environmental Monitoring Plan, interim only because it covers a period where there will be reduced activity on Tract C-a. Also before us, and you received copies, and I think that Hank sent them out in the mail, of what's called the Interim Development Plan or something close, which sets out the schedules and the work to be done during this interim period, and Larry Weiner covered that. Hank, those are the two things we need to cover, whether the Panel has comments on first, the environmental monitoring during the interim period, and second, the schedule of activities which Larry covered, and you have a hard copy as it was submitted to us.

MR. ASH: Yes, the amendment to the DDP is this item which was distributed yesterday. The Panel just had it since yesterday, but right now we are really open to questions or comments on the modifications to the Environmental Monitoring Plan. Mary Ann.

MS. GRASSER: I just had a kind of generic question which is while I understand that you are kind of in a shutdown phase right now, and for that reason don't want to spend an unreasonable amount of dollars on continuing monitoring, it seems like there are some areas where the only way to figure out the effects of what has been done so far is to continue to monitor. For example, I was just making quick notes as you went through the proposal and I admit that I didn't read the material that we got yesterday, yet, but I guess the ones that struck me as particularly strange in terms of trying to figure out long-term effects was the discontinuing the CIR photography program, the discontinuing of monitoring of subsidence, the discontinuing sampling in the White River for aquatic ecology, and perhaps the shift in the chemistry sampling frequency to only quarterly, and I guess I'm not as sure of that one because I am not a water person, but I thought it sounded perhaps a little bit strange. Any response as to how you will figure out long-term effects if you basically close down those portions of the monitoring system?

DR. SLAWSON: Well basically we feel particularly relative to the CIR which relates to vegetation mapping and potential vegetation stress, and I think this relates also to the White River and the water chemistry too, I guess. We feel that the background characteristics of the system have been characterized from the monitoring program that's been conducted on C-a and around C-a since the fall of 1974, and that having characterized that background status, if you will, that we have a rational basis for future operational monitoring to be able to compare those operational monitoring results and make judgments as to whether or not we are seeing anything unusual, whether or not we are seeing anything that is traceable to some activity of ours down the road. So we basically feel that we've characterized things to the extent that they can be with existing technology, and that the data base is sufficient to make judgments for operations down the road.

MR. RUTLEDGE: Let me throw this in with subsidence, since that's my bag, I guess, as a mining engineer. The mine itself is at a stable configuration now and I don't believe we've ever seen any movement on the surface net with regard to that. We have got some valuable data immediately above the retorts but that was on ignition. So as far as the subsidence goes, it's stable.

DR. WILLARD: I'd like to know the process, how do you know it's stable?

MR. RUTLEDGE: First order surveying, monuments on the surface.

DR. WILLARD: They shifted and then they just stopped. Is that the point?

MR. RUTLEDGE: They haven't done anything. But that mine is small and the retorts themselves do not open large horizontal areas.

MR. BOEKER: I had one question about the discontinuation of the avifauna studies. I noticed in this spread sheet that there will be a continuation of the nesting study of raptors, and I wondered if there was clarification on whether you would only check the known nests or also explore to determine if new nests are established during the period of inactivity.

DR. SLAWSON: There will continue to be, because there will continue to be an environmental staff on the tract conducting the various monitoring programs, opportunistic type observations of not only raptors or others but wildlife and other things in general. The study that you mentioned about the raptors is a cooperative effort, and we do intend to continue that as a special type study. This is the specific avifauna study with the transects that are walked, specific to the scope of work that has been deferred.

MR. BOEKER: So if golden eagle nests were established at a site that is currently unknown, it would be detected during this period of inactivity?

DR. SLAWSON: I certainly would hesitate to assure that any raptor nests, golden eagle or otherwise would be detected during the upcoming period. You can't assure that even if we set out that as a specific goal to identify all of them. But certainly there will be efforts underway and opportunistic sampling and just by having people running around, if you will, all over that area will create the opportunity for such sightings.

MR. RUTLEDGE: I might add, Hal, that it isn't just the lessees' work, our people are out there on a frequent basis, and the biologists, between Don and Bob here, take a look at it, but there is no guarantee that they will find everything.

MR. ASH: Carter.

DR. GIBBS: You have indicated that you have basically characterized the ecosystem through your monitoring since 1974. Assuming a substantial delay before you go into commercial development, would you plan to begin monitoring any time before the operational phases to update that data base, in other words, to reestablish your data base?

DR. SLAWSON: Most of these programs that have been discontinued or deferred, color infrared photography, for example, we do anticipate going back in prior to construction, retaking a flight, and therefore establishing that link between the period that we're in now and that preconstruction period, so yes.

MR. ASH: Bettie.

DS. WILLARD: When did you finish the burn?

DR. SLAWSON: It was December 14, 1981.

DR. WILLARD: I have a hunch you would do well to do one more season of CIR.

MR. RUTLEDGE: Any particular reason for that?

DR. WILLARD: Well, because you are not seeing a growing season if you finished in December.

MR. RUTLEDGE: We have several years of that relationship.

DR. WILLARD: Since I don't know what that found.

MR. RUTLEDGE: I can't tell you what we found either, but that program, if I remember right, which was started fairly early in the game, so there are several cycles.

DR. SLAWSON: I don't know how many years of data, but we have data extending back to the 77-78, something like that, I believe was the first pass at that, and we also have photography from the immediate pre and postretort zero burn, for example. We have the 80-81 set.

DR. WILLARD: But it's not nearly as large as retort 1.

DR. SLAWSON: That's true. In addition, the monitoring of the air emissions during the retort burn indicated very few, if any, above background level type readings, and so no plant stress would be identified. It's difficult to take one of these studies as a unit because it does all get tied together. The only time we had what we called anything like substantial air emissions was a period when we were using the flare stack as the emission point rather than, while we were doing some repairs on the scrubber incinerator system, this was only a few weeks while we were flaring. During that period we had an extensive effort to do some special sampling and try to find the plume basically. That turned out to be a period when we were getting a

front coming across the site every 3rd or 4th day which was excellent for air dispersion, it was lousy if you were out there trying to find the plume. And there were only a couple of occasions where we detected observation of above background or anything substantial, and those were short-term; we would take one sample and then come back as quickly as we could to the same location and it would be back down to background. So that would be our high impact period and virtually nothing was detected during that occurrence.

DR. WILLARD: But because of the weather?

DR. SLAWSON: Largely, and that monitoring continued through that period when we were off the scrubber and then the scrubber came back on and during that period the regular monitoring program detected nothing but background levels.

MR. RUTLEDGE: You have to remember that we really haven't detected any impact from development. I'll qualify that in a minute. Corollary to that is that we really have not answered any questions on emissions, which is the goal of the prototype program simply because they haven't really got big enough yet. The impacts - I'm talking off the top of my head and there's staff here and others can fill in some that I'm interested in following, would be the situation with the ground water because we have significantly stressed the aquifers and I've got a slide of that, and if somebody has some time I can flip it up and bring you up to date on what that is - there are some very interesting data. We have disturbed a significant amount of surface acreage which means it's bare, it's being revegetated all along, so that needs to continue. We have placed a lot of raw shale on the ground, and that needs to continue as to impact, so the goals of the interim monitoring are really several. I think I covered them in the beginning. One is to maintain the continuity of the data base we have gathered, using some judgment. Two, continue to monitor at a relatively high level those areas where we have created an impact, the ground water, the spent shale on top, what-have-you. Really, those are the two major important ones.

DR. WILLARD: I think I was raising these questions because although I haven't had a chance to catch up on the last thirty-four meetings I can get a feeling that everything is going well, but I am asking the question so that it will continue to go well because we don't want any of us want egg on our face or on anyone else's face down the road somewhere. There are some things, this one, the CIR this summer, because it is so easy for somebody to take a particular data point that is not there, and blow it out of proportion, and I don't think any of us want that, and I think that one of the reasons that this Panel was established was to ask those hard questions here so that somebody doesn't ask them down the road where we can't get the data points.

MR. RUTLEDGE: Yes, that's the purpose of the Panel, Bettie, I appreciate that.

MR. ASH: Pete, I think you are saying that you feel the necessary things are covered.

MR. RUTLEDGE: Yes but we do throw it open to the panel to be sure.

MR. ASH: It seems that the Panel could ask you maybe to take another look at some of these changes if we as a Panel think you ought to take another look, to reevaluate for example a particular thing, take another look at it and let us know what you

think. We could do that. I'm not trying to put words in the Panel's mouth but that is a thing we could do for you. I don't know that we have sufficient information today to absolutely say you ought to go back and do more of this or do more of that, but express a concern or raise a question about a given thing.

I would like to go back and structure it a little bit and go through on the basis of our work groups and give those chairmen the chance to say anything they may want. I believe what you're talking about right now fits in pretty much with the surface disturbance and rehab area, and we might just start with that work group area and if you all have anything specific you want to say or recommendation, do it then. I didn't mean to cut you off, Bettie, if you have another comment or question.

DR. WILLARD: I think maybe we need to regroup.

DR. GIBBS: I think we might need a little time, as Bettie says, to talk about this among ourselves. I'd hate to make a recommendation that's going to cause a lot of difficulty when really what we may be talking about is a suggestion.

MR. ASH: Would it be possible to come back to this this afternoon and give the work groups a chance at least over lunch to give it some thought and come back. You all will be here this afternoon for questions (Rio Blanco: Yes).

MR. WATSON: Is it expected that we should be mindful that if the project itself, i.e., the primary project has closed, then we could not reasonably expect to see the same level of activity as we saw before. So obviously I think we each have our own area where we'd like to see this continue or that continue but it is once again a question of tradeoffs and balances.

MR. ASH: Yes, I think we understand and accept that as a Panel it is an interim period and we just want to take a look at what's going to be done over this interim period without trying to say go back to a full scale. Pete and I are trying to put it in context. It was a modular development phase program. This isn't the ultimate or the long-range program necessarily, the modular development phase is kind of a standstill - you done this certain part and we are in kind of a holding pattern so I don't think we feel that program ought to go on forever either.

Unless some of the other work groups have individual questions on it, why don't we try to come back to this after lunch. We have a little extra time this morning because and if any of you came in late in the audience, we got a call, this morning, early from the Synthetic Fuels Corporation that Mr. Murphy was unable to make the meeting, he was scheduled to talk at 10 and he got weathered in - I'm not sure whether he was weathered out of Denver or weathered into Denver, and was unable to get over here. So we picked up some time, and to use that time right now I'd like to go back to the work groups and see what they came up with relative to the White River development monitoring plan overnight, and thank you, Rio Blanco staff, we appreciate your presentation and your answers to the questions.

Let's take a 10-minute break.

Break at 10:20 a.m.
Reconvened at 10:35 a.m.

MR. ASH: We had decided I think after the break we would go back to comments or recommendations from our work groups on the White River Shale Monitoring Plan, and I would like to take those work group areas in the sequence listed here on the agenda for today, beginning with Water Supply and Quality, the chairman being Deborah Linke. Deborah.

MRS. LINKE: I guess since my work group is not here I can say anything I want. We have a very brief report on the White River Monitoring Manual, and I will just read it. "We have reviewed the monitoring manual with regard to water-related matters. Generally we feel the manual is quite complete and represents an integrated approach. The project specific impacts are well covered. Our one suggestion is that the data gathered under this program be used in evaluating the regional impacts on the water quality and hydrology, the Oil Shale Office should carefully review the data collected and the methods to be used to be sure that they are usable in effecting the interdependence of the White River Project with other projects in the region."

MR. ASH: Thank you, Deborah. Are there any other comments on water supply and quality relative to the White River Monitoring Plan? Okay, we will incorporate that into our comments to Pete's office if that's the consensus of the Panel. I think we will just take one of these work group areas one at a time, if there are no objections to that. You are basically saying their water data and information should be incorporated in the regional considerations, Deborah?

MRS. LINKE: Right, I was making a suggestion, Hank, that Pete review the information and the methods because it would be a shame to have White River collecting apples and Moon Lake or someone else in the area who are looking at the same area were collecting oranges, and not being able to make a salad out of them. That is our concern.

MR. RUTLEDGE: In other words, it is a concern that has to do with coordination of collection programs and perhaps commonality of the data bases?

MRS. LINKE: The compatibility of the data too.

MR. RUTLEDGE: Okay, that's an area I can dictate on to White River but I would probably have a little trouble dictating to Moon Lake. However, I do converse with Lloyd and some other people so at least what we're doing in the monitoring manuals are available for use in other programs, and people do come through the office and do pick our brains in setting up programs for their own. There is a certain amount of that going on.

MRS. LINKE: We are encouraging you, to give you our support.

MR. ASH: Okay, we shall say so to Pete in a memorandum, along with whatever other comments we come up with.

The next work group we have in sequence is air quality, and Bill Geise, who didn't even know he was chairman of that work group is here today and I don't know whether you all have had a chance to discuss this at all or not, Bill.

MR. GEISE: A couple of us had a hurried discussion in the break, and it appears that some review was done by our air quality people at EPA and the look that Mary Ann gave it that the air quality monitoring is acceptable and expresses an awareness

of the ambient air quality monitoring requirements and the regulatory scheme of things. So overall we find it acceptable.

MR. ASH: Thank you, Bill. Any other comments in that area? Bettie.

DR. WILLARD: Well what we really heard from the people from C-a about acid rain in the Flattops. What is White River going to do about acid rain?

MR. GODLOVE: Pete, what are going to do about acid rain? Acid rain is obviously a growing consideration for the intermountain west although it is quite a different problem as you know from the national discussion of acid rain back East. White River at this particular time has no impending plan to become involved in an acid rain study, although if one is developed and if it is indeed a regional acid rain investigation, White River would certainly be willing to become a participant in such a regional study. So I think basically I can say White River is not interested in going out there and measuring acid rain in a vacuum alone, but if other projects are interested we would also be interested in participating.

MR. RUTLEDGE: Bettie, there are a couple of factors within it. It's a new area and the technology and people who can speak reliably for it are not too well identified. Maybe Glen Miller can give you something on that. I understand the Water Resources Division of the Survey is commencing a program. I think it is partly on Grand Mesa, and I don't know where the rest is, and the Flattops also? It is also a component that is akin to what we did with visibility for it made absolutely no sense for C-a and C-b to go out and study visibility on their tracts, and there we were able to get a cooperative program together. It also fits in a little bit with something we kicked around for years. We've made some progress with the Forest Service, and EPA, and Roger Tucker can explain this a little bit more, on the visibility aspect in setting up on Big Mountain, in Flattops area. And with that it started back away with Terry Thoem in EPA, there was a concept that we really needed to look regionally at air quality, and maybe have an upwind and downwind research grade station, and because of funding and the ups and downs of oil shale and everything else, that really hasn't come to fruition, but it keeps coming up.

DR. WILLARD: I realize that funding isn't looking very much better, but what's the cost of it in the first place?

MR. TUCKER: This subject has been brought up many times and our office feels that visibility and acid rain should both be looked at on a regional basis, and because of that we have cooperated with EPA on visibility in the Bear Mountains, the Flattops, and we're also putting up a station on Monument Peak up behind Rio Blanco Store, to be able to look at any pollutants coming from past Colony, Union, and C-a and C-b or anything in that area. Likewise, for acid rain, the only way you can get a handle on it is to look at it from a regional basis because it is a regional occurrence. On December 22 I believe, I met with the Park Service, the Forest Service, BLM, EPA, all Federal land managers, and those involved with regulations in Denver to discuss what should be done with acid rain. At that time we were waiting on the Water Resources Division's study, which was a baseline study in the Flattops to find out what would you monitor anyway? Would you monitor the lakes, fish, the pH, algae, salamanders, or whatever? And the idea there was to come up with some indicators in the baseline which you could monitor and find out if acid rain was

occurring. So that program was waiting for John Turk's study of the baseline and from there these various Government agencies were going to get together and try to develop some sort of regional acid rain "monitoring" program. We would assume and hope that EPA would help fund it, the C-a C-b people would help fund it, and work with developing a program so that we could all get a handle on what is occurring in Colorado, specifically the Flattops, which is the region that we're really concerned about, and that should be coming sometime this year, I'm not sure of any time, but that meeting will be called when the group has information that they can discuss and work with.

DR. WILLARD: I would really like to work with you on this because I think that if you're and I'm sorry that I sound quite a bit negative, but if you are thinking that you have to monitor to find acid rain in the lakes and streams, that's not the way it's being done in the eastern United States and it's not the way it is being done in northern Europe, and there are very well defined techniques and there are very, very proficient people available, and those people could be brought here to advise, if we decide that is what we wanted to do, and just last week I had someone like that in my office, and it is a fairly straightforward thing, and it also is a very, very critical thing which we cannot leave very much longer. The data that Mike Grant and Dr. Lewis at CU got 2 years ago clearly shows that an area which is much farther east is already being impacted, and I do agree that it has to be handled on a regional basis. So I would like to see us moving with all due diligence in this direction because this may be a sleeper that we really need to close some gaps on, and it is not one which we can afford, timewise, to leave very long, because the areas where they have it they have lost all organisms in the lakes and streams.

MR. TUCKER: I agree with you, and we will bring you in on the meetings when we have meetings in the future. When you say "back East" do you mean the eastern United States or the Eastern Slope?

DR. WILLARD: The eastern United States.

MR. TUCKER: There is a small difference, of course. You can see the acid rain there, you put an umbrella up and there are holes in it. Not to be facetious, but the acid rain effects out here are more subtle and harder to find and therefore if you are monitoring a more obvious thing it is easier to monitor here with the acid rain being maybe 1 on a scale of 1 to 10 and 9 back east, it would be more difficult to monitor it. That doesn't mean we're not going to do it, the frustrating thing now is how do we best do it, by starting right, not just going in blindly and spending a bunch of money and after about a year say "Woops, we don't know what we got." They want to decide what to monitor, how to monitor so it will be cost-effective and tell us something.

DR. WILLARD: Have you brought the ARS into it? They have a new name, but they are the same organization.

MR. TUCKER: There are some people from back East that have been working with the Forest Service, Park Service, that are experts in this area, so there are consultants that will be working with this group. They won't be working just with local western slope-eastern slope people in Colorado, they are people that have international experience in acid rain that will be working with this group in Colorado.

DR. WILLARD: The Agricultural Research Service set up a monitoring network over the entire eastern United States starting in 1976, and they were looking at doing this and as I understood it they have a very open network starting in the western United States. I can give you some names on that.

MR. FERRARO: Tom Turk's work looks at the sensitivity of some of the lakes in the Flattops, and the thing that I was curious about trying to have someone do is take a range of deposition and try and correlate that to some of his work, and develop maybe a set of curves. One of the biggest problems is that we can't with any certainty show that this is a deposition from oil shale or other emissions in the area, so why not take a range either from 10 percent or 20 percent on up to 100 percent and then see what the impact of that would be on those lakes in the Flattops. And that's what I have been trying to promote with some individuals, and one in particular, John, but I haven't made too much progress in that area.

MR. ASH: Lloyd Ferguson, had a comment or a question, Lloyd.

MR. FERGUSON: Well I was just going to mention that Bill Wagner of our staff in Salt Lake has been working and discussing these things with a number of people, and we have been interested in trying to get at least a station set up in the Uintah Basin to do some monitoring with regard to acid rain, and I thought it would also be of interest to note that we have taken on the visibility thing, we have got a station in conjunction with the Park Service and EPA. We took some of our equipment and placed it above Dinosaur headquarters and we're getting a panoramic continuous reading station there that is doing some things on visibility and so we are not uninterested or unconcerned about these things, but this will be kind of a two-edged question, one, where does the money come from, and two, what is the best method for getting it so you come out with some meaningful results in the end, and I think we've all been talking, we're not just sure just exactly what the best way is to proceed at this point, but we will continue to pursue it.

MR. ASH: Bettie, did you have another comment, and Neal.

DR. WILLARD: Well I do think that we have a unique opportunity. I well appreciate and I'm glad you are going ahead cautiously, I'm not saying that you just pull out all the stops and do a shotgun, but there are people that do know enough at this point from other areas that they could help us, and I think that we might well be, if it's appropriate, be a catalyst for drawing all the groups that are interested in this together, and it seems to me we could look to one of the most affected groups which is the tourist industries, and we might get some very significant help from these people if they really understood the problem, because, this is not an insignificant problem, where it has been really studied elsewhere, because people who knew those lakes in the Adirondacks they knew excellent fisheries and then 10 to 15 years later, they don't really know when it fell off, they had no fish, and the same thing happened in Norway. And in Norway - this man who was in my office the other day pointed out that they are spending thousands and tens of thousands of kroner to get limestone back in and that's just a temporary measure, and in behalf of the resources of Colorado and Utah and certainly of Wyoming, I think that we have a really unique opportunity to be a positive catalyst to prevent this in our own area. We have an opportunity from the standpoint that we don't have quite the same concentrations as those two areas, but one of the big problems all across the border, and one of the reasons that people get very uptight, and I see Pete getting a little uptight right now, and I'm sorry, but again I come back to my original

premise, it is better to ask these questions and to raise these issues and make sure where we're with them at this point when we don't have a serious problem than try and go back and make it when it's a serious problem. It is not a problem that will go away, and I think that I would really like to see us really get something active going, and I will do what I can to make the other connections with the other groups that may have equal and greater interest in it than we do in it.

MR. ASH: Certainly one of the values of this Panel, as you point out, is these questions do come up, it also gets communication and people talking together and becoming aware of other things that are happening. I certainly think it is a good idea, and what I would suggest as a possibility, and I will let Neal make his comment in a moment, but that perhaps our air quality work group should take that as a charge to look into it and come back to the Panel with possible recommendations on something the Panel might do or say. The question here at this immediate juncture is whether we should say anything about the White River Monitoring Plan on acid rain. My impression is no, it wouldn't probably be appropriate right now, but I think that for the Panel to pursue your idea is excellent, and I'd like to let Neal make his comment now.

MR. DOMGAARD: My comment is that we keep forgetting we are talking about the White River Shale and it's arid out there. If you had had a monitoring station to try to collect some rain samples from say February on until now, why you wouldn't have caught anything in your rain gage because it's arid out there and I don't think as disturbing the lakes there we have to keep this in perspective. Some of the Panel members come from areas that are real wet. We do have problems that we could maybe work on those solutions, but I think we have to give industry the benefit of the doubt because we do have to have industry.

DR. WILLARD: Well I am very much for you. I was born and raised in the desert, I was born and raised in Palm Springs, and so I understand, and my parents lived in an area that had 2 inches of rainfall and sometimes not that. But I have also seen a big perspective of things where, because we didn't think we had a problem until we had a massive one and we could have prevented it rather than trying to cure it, and it could have helped industry to have done that and they wouldn't have - and I started to point out about the matter that environmentalists get uptight about some of these things because they see it at the crisis point. What I am trying to do here is to get us to really look at something and I appreciate that when you don't have rain you can't monitor it, but there are ways of monitoring SO₂ and hydrogen sulfide and the other precursors of acid rain in air without rain, and ways of seeing what contribution industry might be or might not be making to it. And another reason why I am raising this rather stridently from your perspective is, that the history of the prototype oil shale project from the very beginning has been to try and be a real example of how to do this right and with the utmost cooperation and utmost prevention, and to make industry look like good guys, which they certainly can be and usually are. So I think we need to maybe communicate a little more in the future so that you'll know I am not an enemy but a friend.

MR. WATSON: I have a comment if I may. I think those goals are very admirable and I think it is something that needs to occur. What troubles me is is the Oil Shale Panel really an appropriate vehicle, not so much in terms of the expertise that could be marshalled but public perception. It strikes me that we have the type of public that could see if the Oil Shale Panel is leading this effort, then ipso facto oil shale must be a cause or a major contributing cause of acid rain, and I really

hate to see an industry that has already been accused of a number of things from rape to, you know industry has been accused of it, it could really have the undesired effect, it could have the opposite effect of what we would hope to achieve. That's my concern.

MR. ASH: I appreciate that, Clarke. Of course we are not really - I hesitate to use the term, an action group. We are not going to do this, but if the air quality work group, for example, looks at this thing, which is regional, everybody agrees, and perhaps we act as some kind of a catalyst or give some help to industry, to Pete's office, to the Government, we could consider, but we wouldn't do that without looking into it further. I think clearly it's not something we want to tack on to White River's monitoring plan, and we really should move on on that as quickly as we can, but Pete wants to respond, and Wally has a comment and then we'll see where we're at.

MR. RUTLEDGE: Hank, we have hit these regional issues before. I think there have been two approaches we have taken, and I might liken it to what's known as the Piceance Basin Groundwater Committee, which we think is a reasonably successful method. No. 1 is try to assemble a group that is responsible and credible to address it, and like Roger has brought up one group has been put together to do that. Secondly, work with them and through the process try to determine what we might need as data inputs to whatever they come up with like a model. And one thing we can do with the lessees is work to be sure that the monitoring we're doing on the tract would feed usable data into what comes out. That's an ongoing process we have. I think it is important in these things to establish a group that addresses it and that that group be credible.

MR. HANSEN: Well I would like to ask a question that is a little more specific to the site, regarding figure 2.1-1 on page 2.5, which shows isopleths of the dispersion of pollutants around this model, and it looks as though there's a sort of ridge or a plume of dispersion that goes about north-northwest from the process area, and I understand that this station 3 on the map is a temporary thing and is no longer effective, and I wonder then if possibly station A-10 which is off to the flank of that ridge might provide more meaningful data if it were moved about a mile and a half to the northeast to put it more on top of that plume, so that it would monitor dispersion from the processing area.

MR. GODLOVE: Wally, in responding to that, this isopleth of expected air quality dispersion or the dispersion of pollutants from the White River Shale Project is purely a modeling concept at this point. As you mentioned, site 3 has been not only deactivated but totally dismantled. Site A-10 was developed primarily to monitor our drainage flows during the early morning hours. It's a station that tends to be down in the White River Valley as opposed to one at a higher elevation. Now this isopleth happens to be of average annual emission so you're not just looking at drainage flows or transition flows or synoptic afternoon flows, it's a composite of all three. Site A-10 has a very specific purpose of identifying air quality during drainage flows, and as you will note in reading the manual, White River is proposing a new air station entitled A-14, which will be located essentially maybe another section or two on to the north and west of A-3 as identified on this figure. The purpose of that A-14 station, which is not in place now and we would not propose to activate until just prior to operation of Phase 1, would be to measure concentrations, more or less depicted by this northwesterly movement of pollutants from the project. Does that answer your question?

MR. HANSEN: Yes, it sure does, Jim.

MR. ASH: Okay thank you. Before we go on from air quality and I think we would adopt the work group's suggestion as to this part of the monitoring plan, then I would propose to explore with the work group what more we could do in this area of looking into the regional question on acid rain, and get back both to the Panel and see what we can do to assist, and if the Panel should make any formal recommendation sometime in the future. Hal.

MR. BOEKER: I have one general question. I wondered if the Oil Shale Office is aware of some of the current studies dealing with acid rain that are underway. Obviously, Roger, you're aware that there are studies on the Front Range. Dr. Gibson's study at Colorado State you are aware of? (yes) Okay, that's all I wanted to know.

MR. HANSEN: Are we going to go through this chapter by chapter at any point?

MR. ASH: We had not scheduled sufficient time to do it that way. We were trying to go by work group area. Do you have specifics?

MR. HANSEN: I have a question regarding Chapter 8 that is kind of in the area of air quality but not exactly. It has to do with the climate there. It is on page 8-5, and I just wanted to raise a question with regard to these diurnal variations which in looking at them seem a little excessive and I wonder if there is a typo or something here, in converting Fahrenheit to Celsius and possibly the reverse. I think maybe you used the wrong conversion factor and the Celsius figures are correct and the Fahrenheit perhaps wrong. Look, for example, at the July range of 63 °F which would suggest that if the daytime temperature reached, say, 90°, the nighttime temperature would have to drop to 27, which seems too low. I think what you must have done is converted directly from degrees Fahrenheit to degrees Celsius or vice versa rather than from the range of temperatures Fahrenheit to Celsius or from Celsius to Fahrenheit. As I see it, I suppose this is being picky, but a variation of 48 °F would be approximately 26 °C rather than 9.

MR. GODLOVE: I think the best I can say is that we will check these numbers. At this particular time I deal in nonmetric units.

MR. HANSEN: Yes, I do too, that's why I'm always alert to the possibilities of typographical errors, or something creeping in.

MR. GODLOVE: Yes, there may be a typographical error here, although during the summer you do get very or you can get very wide fluctuations in diurnal temperature variations. Our highest temperature out there can exceed 100° during the daytime. It's not uncommon for the temperature to drop into the 40's on occasion during some summer evenings, so you know, I don't see that this 63° variation, although it looks high, it may or may not be. I'll just have to check on that.

MR. HANSEN: Well I think if that is correct, then the Celsius conversion has probably been misread

MR. ASH: Okay? Then how about our wildlife work group. And Wally, if you have other specific comments, bring them to us at the appropriate work group consideration please. Hal Boeker.

MR. BOEKER: Mr. Chairman, we met as a committee and decided that we are quite comfortable with the approach taken with regard to wildlife as a specific area of monitoring. We have a few general comments that relate in a broad general nature to the ecosystem analysis approach that is being presented. We think it's very commendable that White River Shale is proposing a program which goes beyond the traditional monitoring of ecological parameters, their effort to study both the parameters and their ecological interrelationships carries monitoring to the top of the state-of-the-art in this arena. We have noticed in reviewing the report that the White River monitoring team acknowledges the challenges that are inherent in carrying out this task because with the extreme range of diversity and variability that is found throughout the study area. We hope that the level of commitment in funds, manpower, and technical expertise is equal to the challenges outlined by White River Shale in their scientific monitoring process. We wish them well in their effort.

MR. ASH: Thank you, Hal. That's from the work group. If you will provide me that and any written comments from the work group we will use them. Are there other comments or questions in this wildlife area?

MR. GEISE: Yes, I've got one, Hank. Some of our aquatic biologists at EPA reviewed the aquatic biology section of the plan. I guess aquatic biology might be considered wildlife, so that's why I'm jumping in here. First of all, we'd like to reinforce what Hal just said. We were very favorably impressed with the policy that the White River Shale Project is adopting to carry this ecological analysis into the next phase of examining the interrelationships of all these various parameters. We did have one question about table 4.1-1, where the parameters to be monitored for aquatic biology are broken down into operational, potential, and contingency. I think that is fairly standard, I've seen that before, but our aquatic biologist noted that heavy metals, fish, and fish flesh analysis are listed as contingency parameters and they raised the question as to whether or not heavy metals, fish, and fish flesh analysis shouldn't be operational parameters, given the importance of heavy metals, given the significance that potential leachate problems may cause in terms of heavy metals.

MR. GODLOVE: In responding to that, Bill, I'd like to introduce again, as I did yesterday, Dr. John Carter. Dr. Carter is with Ecosystem Research Institute of Logan. John, in addition to assisting me in preparing this monitoring approach, ERI also handles all of our aquatic biology studies, and so he is the expert.

DR. CARTER: Okay, during last year we realized that heavy metals, of course, were a potential impact, and that there was really no existing data on heavy metals within the White River system itself. So we recommended to Jim that we carry out a heavy metals study this year to determine what the background levels were and the dynamics of the heavy metals within the White River Basin itself might be, and that program is ongoing at this point in time, and we're collaborating with someone at the University of Colorado in Boulder to model the dynamics of the metals, taking into account the chemistry of the river, so that we'll have a better picture of what the future effort, if any, should be, and of course in conjunction with operational monitoring the attempt that we're making at this point is to use the community level parameters which we've mentioned as potential parameters in that table, to pick up very low level impacts which would then feed us into that contingency mode and with that background data then we should be able to identify if a true impact relative to the project has occurred. Does that help answer your question?

Mr. GEISE: Then you don't discount the possibility that you may get into monitoring of heavy metals more extensively than is being proposed right now?

DR. CARTER: Well that's correct, but that's something that we can't judge until we have this year's data in hand.

MR. ASH: And, Pete, to put in context when some more information is available, do you review the plan on an annual basis or something so you would know if something more needed to be done?

MR. RUTLEDGE: Yes, a formal review on an annual basis, there are quarterly review meetings usually by the environmental staff to get at this, and really portions that come up are discussed at monthly tract coordination meetings when they're held, so yes, it's ongoing.

MR. ASH: So it's not going to slip through the cracks, even though that particular thing is not in the plan at this moment.

MR. RUTLEDGE: No, it is the contingency providing one of the community things go wrong.

Mr. ASH: Any other comments in the wildlife area? Okay, then Surface Disturbance and Rehabilitation, Carter Gibbs, chairman.

DR. GIBBS: Well Hank, we met as a group last night, and I will give some of my concerns and then I'll ask the members of the group to voice theirs if they have any. I'd like to reiterate what has been said previously, that this is an excellent monitoring plan, it is very ambitious, it's scientifically based, and we wish them the very best; having spent a number of years in this type of research I hope you can pull it off! As with anything, the more information you get the more questions you raise. I have two questions, suggestions if you will. One is in relationship to the measurement or evaluation or some determination of the structure of the plant communities on the plot. I'm sure this is in the plan but it does not appear that you're going to be looking at the structure of the plant community. Very small changes in the structure of the plant community that may not be expressed in terms of total biomass might be indicators of problems down the line of some form of impact by the development process. And I think you have the data to do this.

The other is that you have used throughout your monitoring plan the null hypothesis. This is excellent. I think you may need to add to that some form of trend analysis that would give you small differences that might not appear at the 5-percent level on the basis of a year-to-year evaluation, using an analysis of variance table. And third is a personal question that I would just be interested as to what species you are going to be looking on your riparian because of their high sensitivity.

MR. GODLOVE: Carter, unfortunately, Cy McKell was unable to be with us today and he would obviously be the most qualified individual to respond to your question and if a more detailed response than the one I can give you at this point is required I'll be glad to get Cy in contact with you or with Pete, however you choose to proceed. Involving the first question, obviously White River has an extensive baseline as to the distribution of vegetation on the tract. That has been an ongoing element of our vegetation monitoring program now since 1975. We have identified what we feel

to be the critical indicators of vegetative conditions on tract, and we will continue to monitor those in the vegetation program. I hasten to mention, though, that our responsibility here is toward maintaining productivity as opposed to maintaining a certain distribution of vegetation on tract, and in that regards I feel our terrestrial wildlife monitoring is equally as important as vegetation monitoring in determining whether the distribution of the vegetation on tract, whatever it is, is sufficient to maintain productivity of the wildlife species on tract, and so I don't know if that is a full discussion of what you'd like to see in our program but that's basically what it's all about.

DR. GIBBS: I was thinking of something that is rather simple. You have all these data - frequency tables as you go back to those plots, would give you changes in the plant structure; that might be an indicator of something, of some initial impact. I wasn't looking at changing the productivity or using this as a management tool but as an additional part of your indicators. In other words, I think you are taking sufficient data, it's a matter of just further analyzing that data in terms of plant distribution and frequency.

MR. GODLOVE: John, would you care to comment on that?

DR. CARTER: Yes. A couple or 3 years ago as part of the terrestrial wildlife program we were interested in explaining more of the variability than we could explain just based on month-to-month trends, so what we did is go to the field and do several different measures of vegetation structure, including foliage height diversity, physiognomic diversity which takes into account whether it was an ever-green or deciduous shrub, and the relative height and volume occupied by these shrubs, and then we also had data on plant biomass, annual plant production, sagebrush stem leader growth. So what we did as the result of measuring these parameters is attempt to explain bird species richness and diversity in terms of structural parameters relative to the plant community and we were successful in relating many diversity parameters of plants to the diversity parameters of birds. In other words, the more diverse plant communities tend to have more diverse avifauna community, and then superimposed upon that the level of population of the biomass of birds is more related to the biomass of plants, so we felt we were able at least at some level separate out the effects of structure from the effects of annual plant biomass generation. In terms of the question on trends, as part of the ecosystem analysis chapter 8, we not only intend to look at the state variables from month to month, year to year, habitat type to habitat type, but also to attempt to look at the trends, in other words, is succession occurring, can we detect succession if succession exists, that sort of thing, within each type of community. Does that help?

DR. GIBBS: Anybody named Carter can't be all wrong! Yes, this is what I was looking at and as I say, I was sure you had the data and I am sure this has been considered but I think it needed to be expressed here before the Panel. One final question on riparian.

MR. GODLOVE: Obviously in looking at the riparian area we are not going to center on the cottonwoods. We generally focus a little bit lower on the horizon. Basically we do look at the shrubs and the grass species involved in our riparian monitoring program. We also are including a microbiological analyses in the riparian area, at least at one location, I can't recall, I would have to check, to see if that was

potential or operational but it's one we are evaluating the effectiveness in determining the impacts of our project on that level, within the riparian area. Obviously if you begin seeing changes at that level you might expect changes to begin manifesting at generally higher order levels. Again I go back to the interrelationships here, monitoring vegetation is just one aspect. We also have very extensive terrestrial wildlife work ongoing in the riparian area which again is another indicator of to what degree that's being stressed by our project or other projects in the area.

DR. GIBBS: I think your ecosystem analysis that you have in chapter 8 is an excellent addition. It shows how you can interpret your data as it's accumulated. Hank, I'd like to ask the other members of this committee to raise any questions or suggestions that they may have in addition to what I have. Wally.

MR. HANSEN: Just a small question. With regard to your subsidence monitoring, Jim, I think you've expressed the belief that there probably won't be a subsidence problem and I'd be inclined to agree from what I've heard. Have you thought about any kind of continuous monitoring, something that would give you a continuous readout unlike a survey. Maybe some geotechnical gadgetry of some kind, like tiltmeters or strain gages?

Mr. GODLOVE: Wally, I am no geologist so I'm really not the one to be addressing exactly how we're going to proceed with subsidence monitoring. I'll just mention a couple of things. The mine is being designed such as subsidence doesn't occur. There are some real operational-related problems if subsidence does occur, so obviously we are taking quite a look at how the mine is going to be designed to prevent subsidence, and that's why we say we don't expect subsidence to occur. Obviously we have first-order surveys on tract now that we will make a part of our subsidence monitoring program. There will be mine-strength-related monitoring, subsidence-related monitoring done in the mine as it's developed. Really, we included this as special studies for two purposes, No. 1, just to give the Oil Shale Office some indication that subsidence is a concern of ours and we will monitor it.

Secondly, because it's in special studies that more or less indicates that the monitoring program is to be developed. We haven't fully identified exactly how we're going to proceed with subsidence monitoring. That will be developed in coordination with the Oil Shale Office as we get further along the line on our mine design and construction and eventual operation. So that's probably about all I can say now. Now on-line continuous monitoring, certainly if the technology is available and it is cost effective to do so, would be considered, although I would imagine most of the effects would be so subtle that I don't know whether continuous recording instruments would be really cost effective in this regard, but this is to be determined.

MR. HANSEN: I would think that perhaps the only place where you might get a subsidence problem might be over in the inclined haulageways or something of that sort, as it gets close to the surface.

MR. RUTLEDGE: A couple of points on that. You're screening a broad area where you don't know whether you are going to have any surface subsidence or not. We would probably come back to the first-order survey. If you noticed in this, the initial effort is to put down the access and really get a test mine open, and during that test mining would be the whole suite of rock mechanics because what is found in

that test opening will be the final piece of information to complete mine design. It's been addressed elsewhere that way, C-a did address subsidence over the roof of the retorts, but that had to be figured out when they finally got underground. So really the surface subsidence program which you see here is one that has to be in place and we figured the best method to do that is with the first order of surveying, but then there'll be a lot of work done directly in the mine.

MR. HANSEN: You're talking about rather competent rocks, isn't that true?

MR. RUTLEDGE: Yes. It has been said that oil shale is a great homogeneous ore deposit but it is not. There are individual surprises you find that are different on C-a than C-b. There are weak points in that rock, but then again you don't know until you get underground, so the first piece of good information will come from the test rock mechanics underground.

MR. ASH: Bettie.

DR. WILLARD: I'm curious if we can get a little more definition if the time allows on this matter of productivity, because what I can see at this point and it probably is not really true, is that we can have a definite change in species but get the same productivity, so I would like to follow up on Carter's question on this and get a little bit more if you could, information about exactly - I agree, we all sat and talked and lobbied you quite a bit last night after everybody else left the room, because this has been an area in the whole of monitoring and the whole of environmental discussion for a long time that needs to be approached, and you are taking the bull by the horns and looking like you are really doing the job. But just more for information than anything else I would like to get that point clarified so I could go further in my thinking with it.

MR. GODLOVE: Dr. Willard, like I said, our interpretation of the environmental requirements of our lease is that we maintain productivity of the area. We more or less translate that to mean we want to support the same levels of wildlife and to a certain degree the same levels of domestic use of the tract environment, and basically the region around the property. We are to some degree less concerned about the diversity of vegetation that exists on tract as long as we can maintain the productivity. Now we plan to maintain productivity during the project development. We would expect to maintain the same general levels of wildlife and livestock in the general region as our project develops. Now we do this, and this was in the Detailed Development Plan, by several mitigation procedures. One, for instance, is possibly interseeding of areas which have a very low productivity at this particular point which may be stressed to some degree at this time by the current use of the tracts. So, you know, productivity is basically the direction that we are heading. I don't know if this fully responds to your question, but that is basically the direction we're going. Now one other area, you know, is the esthetics of our reclamation efforts are also to some degree very important to us. We don't want to have an island effect out there where our efforts to revegetate disturbed areas of the processed shale stand out like a sore thumb from those areas that have not been disturbed, and so because of this our reclamation efforts are directed toward recontouring in somewhat of a natural fashion, and revegetating in a manner that it will tend to blend in with the natural environment until such time that the seed from surrounding vegetation begins to immigrate and it begins to look normal again. So that's another aspect of our reclamation effort.

DR. WILLARD: Well I think that pretty well takes care of it, because one thing, you know, that could happen would be that one of the least palatable species could give high productivity, if you were just basing it on clipping studies. This is what I was trying to get sorted out, and where, if you are basing it on the ultimate product, the wildlife, and of course they are pretty choosy what they clip, so that will be a very good test.

MR. GODLOVE: Well we see that as really the acid test, if you will. If the animals don't use the species that we transplant, we have wasted our time in the area. So that's basically the approach that we're taking. Now this isn't contained in Environmental Monitoring Manual and to a great extent it's not discussed in the Detailed Development Plan, but White River in cooperation with the Oil Shale Office and BLM has developed appropriate seed mixtures for reclamation of disturbed and processed shale areas, and also the types of plant species that will be transplanted into the area. All of this is taken into consideration in the selection of those different types of species that will be replanted in the area. So it's all folded in.

DR. WILLARD: So is there provision also for upgrading that as our information is upgraded as to what really works, so you throw out things you might have mentioned this year when you found out new things 10 years from now?

MR. GODLOVE: Well I think that's really the nature of the prototype program. Anyone who says they know it all is a fool at this point in time and we don't know it all, and as we gain information, surely the plans will change, but of course they'll only change following approval of the Oil Shale Office, and after we've justified why the change needs to be made. Of course it's in our best interests to only do what's going to work and so if on our test plots we begin seeing things don't work, obviously it's foolish to continue that type of practice, so it's a constant learning process.

DR. WILLARD: Super, super! You gave a beautiful answer to a tough question because unfortunately not everybody takes that attitude, and some people think that because you have got it in a plan you don't want to go back to Pete so they stick to an initial plan without building in the evolutionary process and the evolution of information like with species and everything else is very important.

DR. GIBBS: Your turn, Pete.

MR. RUTLEDGE: Bettie, that's what keeps me in business, it takes those dynamics. In general, if you're interested in following up on that I commend you to scan our monthly report that comes out. We've been doing that since pretty much the start. There has been great debate of whether you've got too much in there, you haven't got enough, but it basically tells you everything that flows through the office.

DR. WILLARD: That is super, really super.

MR. RUTLEDGE: Also all of the mitigation, revegetation type work, reclamation work, really the preliminary has been done primarily in Colorado and being is done on an experimental basis. We set up a series of hypotheses and then try to test whether the brush-beating is doing any good or not, on an experimental basis before we launch into some grand scheme. The same process is being applied right now with the reflector survey which we have going in Piceance Creek road to see if we can do anything about road or deer-car collisions. Even that is being done on a control

treatment basis to try to come up with whether it's effective before we launch into a full-scale effort.

DR. WILLARD: Well the more carrots you can keep out in front of the evolution, the better this whole effort's going to be I think, because somebody told me the other day that the half life of information today is 6 years and that frankly to an academic is a terribly scary figure, it means you are out of date before you really even have an advanced degree in some cases. But also it means there are a lot more solutions coming down the road very, very rapidly, and so I hope with whatever influence we may have on the permanent project that we can build this in because one of the things that is very, very important both in engineering and I'm sure you see it very clearly in engineering, and our other facets of use of knowledge is to keep on using the cutting edge rather than the old plow with the wooden handle.

DR. GIBBS: Mark, did you have a question?

MR. BUBRISKI: This question may transcend from the surface disturbance concerns possibly to the socioeconomics, but I'll try it and see what happens. Given some preliminary discussions I've had with some of the White River Shale people they have talked about large man camps out at the site, possibly up to 2,500 or 3,000 people. Has some thought been given from either White River or the BLM over in Vernal as to a method or monitoring process to keep those workers basically on the tract and not scattered all over the place where you run into potential problems not only with vegetation concerns, etc., but maybe some adjacent ranchers and sheep and cattle, etc. I just throw that out because I don't know.

MR. GODLOVE: I don't know that there is an answer to that question. While the people are on the job you have a great deal of control over their activities, while they are within the camp you have a great deal of control over their activities. But when they are not on the job and they are not in the camp, as long as they are not breaking any established laws or regulations, we really cannot control the individual lives of our construction work force. We feel that by placing the camp on tract we have in addition to our own rules and regulations we have Pete's office to assist us in controlling the activities of these people. I think this is something that's going to have to be looked at as the program develops and I'm sure that whatever problems develop a solution can be achieved by cooperation between White River, the Oil Shale Office, BLM, and Uintah County. So I think that's about all we can say on this question right now.

DR. GIBBS: Jay, did you want to make any comments? (No.) Well, assuming I can digest what's been said I will get you a statement by tomorrow before I leave.

MR. ASH: Okay, thank you Carter. That essentially completes the work groups that deal with the physical environmental factors which are covered in the monitoring plan. If there are no other comments or questions on that, in general or specific areas - I guess we do have some, Bill Geise.

MR. GEISE: Just a quick one. I had the quality assurance folks and the data analysis folks at EPA look over the report and they gave me a few comments. Unfortunately it is in a language that is foreign to me, and I didn't have a chance to get an interpretation before I came out. I will send those along to you for what they're worth. I will ask one general question. How does the White River Shale Project plan to make sure that the quality assurance-quality control program is

carried out? Are you going to have a designated quality assurance officer that tracks these things?

MR. GODLOVE: Bill, as outlined in the manual itself, each discipline as far as Q-a and Q-c goes is handled as a separate entity. The Q-a and Q-c program applicable to each disciplines are really developed specifically for that discipline. White River at this time does not have plans of bringing on board a quality assurance person to basically track this. What I might mention is that each of the disciplines as a requirement of the 1981 environmental monitoring contracts with White River, and I mentioned, all of the environmental monitoring done by White River is done through consultants, at this point in time. Eventually we would hope to bring it within the White River structure but at this time it is done by consultants who are hired by White River. Each of those consultants were required during 1981 to prepare a relatively detailed quality control and quality assurance program. Now obviously for our air quality system a very elaborate Qa-Qc plan had already been developed and had already been implemented. We have recently prepared quite a detailed Q-a plan for the water resource program. Really I can assure you that all of the data that the White River collects will be done in the manner that is competent and assures the best quality data that can possibly be selected, and I think in doing this it will be done through the use of qualified competent professionals who are out there in the field who do this day after day after day. All of the consultants that have been working with White River have been working with White River for many, many years at this time. Each of these disciplines, as I mentioned, has the Q-a, Q-c procedures that are inherent within that discipline. This is kind of a roundabout discussion but I can assure you that Q-a is an important element of each of the disciplines, it will always remain an important element in each of the environmental disciplines, and if White River ever becomes aware that Q-a is slipping, we will do whatever is in our ability to ensure that we recover quality within the program wherever we might have lost it.

Auditing is obviously another important aspect of the Q-a program, especially in the air and the water programs internal audits are an important element. To some degree they are less important in the biological areas. Basically that depends upon collecting the data in the proper manner, handling the samples in the proper manner, recording them, analyzing them, and then subsequently storing the data. So it's somewhat different than the more analytical approaches to the air and water resource monitoring systems that can be looked at against certain established criteria for instance.

MR. ASH: I believe we have a couple more comments. Hal.

MR. BOEKER: I think it might be worth mentioning that there are a number of endangered plants in eastern Utah. We had our endangered plant botanist take a look at the material presented by White River Shale and they find that industry has done an excellent job in documenting the identification and location and presence of endangered plants and there is no conflict that we can see in that regard.

MR. ASH: And Bettie Willard.

DR. WILLARD: I just might mention in regard to this question that Mark asked a little earlier that it might be interesting to look at how the Alaska Pipeline Construction Company handled some of these socioeconomic problems, because this was one of the major concerns of the people in the State of Alaska, what the people did

when they were onsite and what they were doing when they weren't working, and they had some very innovative approaches to solutions which worked reasonably well. There were a few problems but generally speaking they had solved quite a few of these fairly serious problems and so it might be interesting to contact them, and I can give you some names and things like that. I would recommend that because I think it's an ongoing concern for those people in the area and it could help them considerably.

MR. ASH: Pete.

MR. RUTLEDGE: There should be shortly, Bettie, a report out on an effort by Lawrence Livermore and Burman Lorensen did it on the man camps and desires and problems. That was in the local area we reviewed it in draft form, it's a little lengthy but it contains a lot of valuable information and when it comes out I will see to it that everybody who is interested gets that. Additionally, I don't think we have any written material coming out of the Alyeska experience yet, and if you have a source for that I would appreciate it.

DR. WILLARD: I'll see you get it.

MR. ASH: Okay. Thank you all. Anything further?

DR. GIBBS: Yes. I would like to see the reclamation group just momentarily after we close.

MR. ASH: Well that concludes our consideration of this environmental monitoring plan. We'll provide to Pete written specific comments and as best we can a general summary of what the Panel has to say about that. That actually leaves two work groups unconsidered in this particular plan, Socioeconomics and Transportation. There appears at this time to be nothing new in the transportation area anyway, but relative to the socioeconomic area Pete provided me yesterday with a copy of White River's socioeconomic monitoring program which we will reproduce and distribute to the Panel and it was alluded to yesterday and one of the presenters talked about it, for example the monitoring form, and we will provide that to the Panel and if it elicits further comments we'll get them to Pete, if necessary before the next Panel meeting.

It looks as if it is just as well Synthetic Fuels Corporation wasn't here this morning, we wouldn't have had time for them. We are suddenly a little behind time in our schedule. I would, however, want to provide the opportunities for any public comment that we had scheduled at 11:15. No one has indicated a desire to make any comments to the Panel but I will provide that opportunity now in any case, and we can do it again this afternoon if anyone wants to say anything on any issue this afternoon. Is there anyone who desires to make any remarks to the Panel, about the Panel, or oil shale in general or anything else? Okay.

Then we will recess for lunch, and I know some work groups are going to try to get together. I propose that we reconvene not at 1:00 but at 1:15 p.m. That give you an hour and 15 minutes for lunch and any discussions you need. Thank you.

Meeting recessed at 12 noon

AFTERNOON SESSION OF MEETING OF THE OIL SHALE ENVIRONMENTAL
ADVISORY PANEL - May 12, 1982

MEETING CALLED TO ORDER AT 1:15 p.m. by Mr. Ash, Chairman.

MR. ASH: I would like to reconvene the meeting and turn to the next item on the agenda which is a review of the remaining prototype project we haven't talked about yet, that of Cathedral Bluffs Shale Oil on Tract C-b and I'll turn it over to Pete again.

MR. RUTLEDGE: First I'd like to introduce the Honorable Robert Loucks. Bob, it's your show.

MR. LOUCKS: Thank you very much. Before I start into our presentation I'd like to introduce the contingent from C-b here today. They will be available to answer any of the questions you might have. In the first row there, is our Corporate Counsel, Dan Hale, whom I think many of you know, and in the second row on the right is Bob Thomason, whom I know most of you know. Next to Bob is a relatively new face, George Wilhelm, who is our Vice President of Mining and Operations, and under that responsibility he does have overall charge of the environmental, health, and safety efforts for the project. And sitting next to Eric Hoffman is Ed Baker, who will be making part of our presentation later on. The presentation we would like to give you this afternoon will be basically in two parts. I'd like to give you a brief overview of the project status as it currently is and with just a little bit of history as to the past few months as to how we got to where we are today. Then following that will be the meat of the discussion, that will be Ed Baker who will be discussing our interim monitoring program with you.

In the last part of 1981 - December, you all read an announcement I think whereby Cathedral Bluffs went into a - the way the newspapers put it, a cutback mode. The papers more or less stated the reasons but I'd like to just briefly go over those with you for your understanding. They were primarily the result of a very intensive estimating effort that we had just accomplished with our engineering contractors that we had under hire at the time. The results of that estimate combined with the current world economic situation led management to conclude that it was time for reanalysis, a time for retrenchment, to decide in better terms what the overall social and scope of the project should be, and so indeed we did embark upon that path and as I will show you in a little more detail in a moment is exactly where we are. Just to kind of put it into context and the words are better than I could give you anyway, I'd like to just read a couple of sentences out of a letter that our president just sent to Pete explaining some of our position. This is after some review and analysis of the estimate, and it says: "The partners of Cathedral Bluffs determined that it was most prudent in order to assure the orderly development of the lease tract and conserve the resource to limit work on the tract to that which was currently in progress and that which is necessary to properly maintain the tract and improvements and protect the resource. These efforts include the installation, commissioning and placing hoisting equipment in use, and shaft dewatering and water disposal including reinjection. At the same time we will pursue reevaluating the development plan, estimates, perform significant offtract work, and further analyze environmental control requirements." And I'll get into those in some more detail here in just a moment. But really in response to a question by Bettie Willard, I'd just like to read one other sentence which I believe affirms the commitment of the two partners in the Cathedral Bluffs project to go ahead with the project. That's

always a question in this business. "We believe that we are proceeding in full compliance not only with the lease but with sound conservation principles toward a development program which will meet the production target set forth in the lease."

With that little bit of preamble then, I'd like to discuss the relatively short-term schedule. This schedule has been submitted to the Oil Shale Office, and I'm not sure whether you folks have it or not. It's basically in two sections, that work which as I mentioned in the first quoted sentence, is to complete the current work on tract, and then the bottom section is the offtract engineering-type work which we are, if anything, picking up on. The tract, as many of you have seen, has been developed to the extent that we have three large-diameter shafts sunk and headframes erected over those shafts and are in the process of completing the outfitting of those headframes. The shaft-sinking work is essentially complete. The contractor moved out finally at the end of April. The headframe outfitting, which is the installation of the hoists, electrical gear, HVAC, and that sort of thing that is required for the operation of the hoist, is underway right now and is projected to be complete by the end of September this year. We have been, are, and will continue to dewater the two large-diameter shafts through the foreseeable future, in fact maybe I should clarify that, we have no plans to not dewater those shafts at any time in the future. The water that we are collecting from those shafts we are currently disposing of by reinjection into essentially the same strata from which it came, and I believe Ed Baker will discuss that part of the program in a little bit more detail. We have, primarily with the arrival of George Wilhelm on the scene, now in place a site operations and maintenance staff. Those people are getting well established and have formed the nucleus for the permanent operations staff which will of course grow considerably larger in the future. These people are responsible then for such activities as there are onsite right now, which are primarily water handling and the environmental monitoring. Ed will speak more about this reclamation test effort. I'll pass over that.

Let me skip the next two and drop down to the bottom section. I'd like to emphasize that you can see this engineering analysis which is the analysis of the estimates that we got in 1981 plus combinations of other possible development schemes, that is not yet complete, that is not projected to be complete until the end of next month, and so most everything that I will say today will not be definitive because the analysis is not complete and the conclusions really have not been reached nor recommendations made to management. At that time, at which time we really do expect to focus on a single development plan for the tract, then we will go into a more detailed engineering phase, which I have called here Prepare basis for design, which is an engineering preparation of specifications and that sort of thing. Concurrently with that there are these tests going on at Logan Wash on the modified in situ process, the Occidental modified in situ process. You will see, those of you who are going to Logan Wash tomorrow, will see those and what's going on there in great detail, and get a much better perspective of that effort, but just in summary those tests that are going on are very successful I'd like to say and are meeting or exceeding the early expectations. As that work is going on and then whatever else that we may have developed over the years, we are analyzing then just where the modified in situ development of the tract fits into the overall design, and indeed it does fit in.

One of the candidates for process selection is the Union above-ground retorting process and to that end we have just completed some pilot tests in Union's plant

research facilities in California, and those tests were quite successful and encouraging.

We continued to need to know more about the geology and hydrology of that site. We probably never will know enough, even after we begin our major mine development. Picking up on a theme that's been repeated over and over, not only in this meeting but in prior Panel meetings, this is a prototype program and we do need to do all of these things to develop data because the data just does not exist. One of things that we do intend to do in 1983 is a continuation of our coring program to get some more geological strata data from the tract. All of these things then lead to picking back up the construction leading to oil production. A particular item here and the reason it's on this chart is one that has been addressed in specific discussions with the Oil Shale Office is that we do intend, at the appropriate time, to develop off of the V&E shaft, which is the smaller shaft that we have sunk. We have allowed that one to fill with water because it wasn't needed during the current period, but when we do need it, which is projected to be 1985, we have a program that we have discussed with the Oil Shale Office as to how we will dewater and recommission that shaft.

Our current plan will have us begin actual mine development in 1984 and then just about a year later we would actually start construction of the surface facilities, the above-ground retort and so forth. Now let's go back and look at these two lines that I jumped over.

As part of the overall engineering analysis to pick a preferred route, we need to do a fair amount of engineering design before we can really then say what the details are that would be necessary for preparation of a revised Detailed Development Plan. So we are proposing that we will have those details and have enough in hand to submit a revised Detailed Development Plan to the Oil Shale Office by the end of the third quarter of 1983. Concurrent with that we will have developed enough engineering design so that we can begin preparation of our PSD permit and that should be a timely submittal of that in order to enable the start of construction as we have shown.

Just to put some of this a little more in context, we'll look at the next slide which shows the projected manpower. Now this is on the tract, I emphasize that this is on the tract itself. We are currently in this 100-person range, which is total contractor and C-b's staff, the contractor work will be done by the end of the year, actually in the fourth quarter of the year, and we will have reduced our overall staff, this staff being primarily in support of the construction down to a maintain position level, and that is what we do project as was just shown for the year 1983. Now it's important to remember that this is not all of the C-b staff by any means. There are another, in round numbers, 70 to 80 people remaining in the Grand Junction office and these are the folks that are performing all that offtract engineering analysis and engineering design work.

That pretty well wraps up what I wanted to say about the current status of the project. It might be appropriate to entertain questions on this part of it before I turn the program over to Ed. Have we covered everything so well there are no questions?

MR. DONNELL: I'll ask a question, Bob. You have that item on prepare a basis for design and a line on that that goes all the way through 83. Well it doesn't really

end at the end, it goes into 1984, the first quarter of 1984, and that isn't the end of it. How long do you anticipate that will take and will those hold up your activities with respect to the commercial operations on the plant until that's through?

MR. LOUCKS: No, in a strict engineering definition that work will end here. The program as it is currently envisioned, of course subject to our submittal and review by our management, is that we will be ready to go to an engineering contract right at that time, and at that time we will have completed bases for design that we will give to the contractor for him to develop the detailed engineering plans.

MR. RUTLEDGE: Bob, you indicate a full year for preparation of the detailed development plan. I assume "submit" would probably mean a draft, or do you figure that's final?

MR. LOUCKS: No, that figures to be the final date. We would be doing as we have been doing with the revised DDP, reviewing this with you all through this period.

MR. RUTLEDGE: Coming up to submit it so you can go forward to the Panel.

MR. LOUCKS: Yes, we are hoping this is going to be the trigger point for the official review so we are figuring to submit it to you in final form at that point, October 1, 1983.

MR. RUTLEDGE: You could shorten your approval time up to 3 months probably.

MR. LOUCKS: Well we'll take it if we can get it. Okay, if there are no other questions I would like to turn the program over to Ed Baker and he'll discuss the interim monitoring program.

MR. BAKER: Thank you, Bob. The main point I want to make today is the fact that we are continuing an awful lot of studies through this interim phase. This is our studies during 1981, and these are the studies we will be doing this year. If you look at the bottom here you see that during our developmental phase we were scaled up with a full staff of environmental people out at the site. We had 136 man-months, and during this interim stage we will have 81, with the intention of continuing the important studies, to continue these studies so that we can pick them up once we go into a construction phase once again.

You have a copy of a version of this. The Panel does in their handout. I've shortened this down to just show C-b studies that maybe we can kind of glance through. On benthos and parphyten there will be no change in the studies from our construction phase; from 1977 to 1981 was our construction phase. We will continue these. On terrestrial vegetation we will eliminate most of our terrestrial compositions and density studies because your vegetation does not change very rapidly out there on the tract. We have one so-called impact area where we irrigated with shaft water and we want to do that again this year in order to see the effects of that sprinkler irrigation. So far we haven't seen very much change in the vegetation in that impact area.

On herbaceous productivity, we will eliminate that, all except for the chained pinon-juniper and if you've been out on the site you'll know that the chained pinon-juniper is the major, the most important vegetation type on our site. Also again in our impact area irrigation and a brush-beating area that we brush-beat

for a mitigation project, we will do a herbaceous productivity to see how well we have performed on those two impact areas. On shrub productivity we will drop nine transects over on a distant ridge that is about 2 miles west of the C-b tract, but we will continue the other studies that we have had going on the tract and in the near vicinity of the tract.

On microclimate, we had 10 sites. We want to drop it back to the sites here, we have shown four of them, we feel that with these four we can characterize the C-b tract well enough with just these during this interim phase. Again on deer day use, we feel that deer are a very important species on our tract. We are right in the primary migration route, and we want to continue most of our studies, we'll drop only nine of those transects, over on that distant ridge again and continue to do the studies on tract and within a mile of the C-b tract. We've been finding some very interesting things with our deer-day use studies, such as that they have correlated very well with the Division of Wildlife studies for the whole region, and so far we have seen no effect of our impact on the deer herd from our operations to this point. But it is very important to us to keep a lookout for these deer. On deer distribution it's not shown here, but we will continue to do weekly counts along Piceance Creek, all along the 41 miles to determine the concentration points of the deer. One of the reasons for doing so much on deer still is the fact that there is so much variation in the deer herd out there over the years of our project. We feel it is because of the climate mostly, that the deer herd has dropped so much, but we see some very interesting changes and from the data we've seen we cannot just stop right now, we have to continue on our deer studies.

Again deer road counts, we are continuing to do those also. Deer mortality, we want to reduce this number, and we have worked out with the Oil Shale Office and the Division of Wildlife that if we could come up with some extra volunteer help, we will go ahead and continue all of our sites there. If not, we will continue the major mortality transects. On deer age class we'll continue to do that, coyote abundance, we will discontinue because of the poor data that we've been obtaining up to this point. We just feel that the time spent on this and the data that we have accumulated do not justify continuation of this project. Lagomorphs (rabbits), we will drop nine transects, on "Big Jimmy" again and continue to do the ones on and around the C-b tract. (Discussion on distinguishing rabbits from hares).

On small mammals, this is incorrect, what you have in your handouts, we will discontinue small mammal trapping on tract or around the tract, except in the sprinkler areas where we will continue that again because that is the one impact site we will want to continue to take a look at.

Avifauna (birds), we will discontinue, raptors, there's no change, we will go around and check all of our nesting sites, and Hal, in answer to your question, we have over 100 sites that have been used around the C-b tract by raptors over the years and normally only about a fourth of those are used in any one year. Now they will rotate, use it one year and not the next year. We go around and check every one of the nests that we have identified over the years and he also looks for signs of new raptor nesting sites. In regard to other species, like avifauna species that may be unusual to the site, we have a wildlife biologist out on the site year round who looks for any peculiar species that we may not have picked up in the past.

On horses, we don't have any horses on the C-b tract. We don't worry about them. On tract topography, as was mentioned earlier we are dropping color infrared. We do

plan to have available to us LANDSAT photos that will be taken and will be available to us for our analysis later on.

On air quality, we will continue our visibility study in cooperation with C-a tract. On particulates, that's one of the few things that we have seen out there affecting, well, that we've been able to identify out there, the particulate levels, that varies somewhat. We do want to continue at three sites the particulate sampling. Air quality, we will continue two stations, for all the parameters that we have in the past, 0-26 is a new station, it's off about 2 miles to the south of the C-b tract. We want to continue that to get some correlation with this 0-23 site which is a long or old standing site, and we think 0-26 will be a much better control site that we will want to run for the rest of the project.

On meteorology, we'll continue three stations there. One of the more complicated monitoring programs is the water program. We have seen effects out there of our dewatering, of our injection of water back into the ground, and so this is one program that we worked quite hard on with the Oil Shale Office, to work out a program where we could try to identify if we have any further effects on the ground water from our dewatering or from the fact of the reinjection of that water back into the ground is mitigating that effect. It is one of the hardest things to monitor, because it's something you can't see, we have a great amount of monitoring stations to get a handle on this. Everything as you can see from surface stations, seepage springs, ground water, deep aquifers, the upper and the lower aquifers, and also a portion of our lease we are required to monitor leachate from shale. We are doing that on our raw shale pile, we also in cooperation with EPA doing studies on the raw shale on our disposal site. On impoundments, we have monitoring wells at our three ponds, monitoring leakage of this water into the ground-water system. Now if I can have the other two vugraphs, just to give you an idea of the great amount of work spent on this and the scale of it, these here are the identification of the different wells we have on and near the C-b site that we monitor. This is the frequency of our monitoring. The more important wells near the impact sites, our dewatering shaft and our injection sites are monitored very closely, as wet get further and further from your impact site and the wells that we have not seen very much impact on, then the monitoring was cut back.

Again additional wells that we will continue to monitor and the frequency. Again I want to stress that we're not cutting off all environmental studies, we are cutting back to a level more or less a kind of a baseline sampling program, or just to provide continuity of the data we have on record and see if that data changes, and we've picked certain select species or key species or most important we feel, to continue monitoring. We feel that we will be doing a great amount of work out there during this interim period just to provide this continuity from our baseline then our construction monitoring phase, and now our interim phase and when once we go back to construction. That is all I have. If there are any questions?

MR. FALLOT: You mentioned your use of LANDSAT and I really question whether you can even come near enough with that resolution to do you any good on your interim monitoring. Would you care to comment on that?

MR. BAKER: Yes. As you might know, the resolution has been improved on that, from 80 meters to 30 meters. We feel that would be a great improvement in the LANDSAT program. Now we're not looking for 1-acre or 2-acre impact areas. We're looking

for large impact areas where we feel we can pick up with the LANDSAT program. We feel that is a back up approach to look at during this interim phase. During our construction phase we will get back into aerial photography work where you can get a better resolution and a lot better look at the vegetation, but we feel during this phase the resolution will be good enough to pick up large impact areas such as you might see some large beetle-kill areas from insect damage to the trees out there.

MR. FALLOT: I just wondered.

MR. ASH: Well that was quick. It looks like you guys got off easy. That's the advantage of being the last project up perhaps. Pete, do you have any comments you want to make?

MR. RUTLEDGE: Well here again there are two actions before us in review or whatever the Panel wishes to comment on on the interim Environmental Monitoring Plan, and also we will have to approve the schedule which you saw here and heard Bob Loucks go over - any comments made on that.

MR. ASH: Panel, any comments on the schedule, on that interim schedule? The schedule itself doesn't have any particular environmental aspects, but Pete's asking for any thoughts we have. It looks like there will be a plan back in about, I forget the timetable.

MR. RUTLEDGE: Well on that schedule we've received what you saw on the board. There also is a letter which Bob alluded to and quoted from which we'll probably request be fleshed out a little bit in the form of a short plan, like you received from C-a. Basically you've seen the meat of it, though. We don't anticipate anything changing. I'd leave it to you, Hank, I guess it's not vitally important that we approve that schedule tomorrow, if it's the desire of the Panel to see the final product, whatever.

MR. ASH: Bettie.

DR. WILLARD: What's the procedure on allowing us to look at certain parts of that before approval. For instance, the PSD?

MR. RUTLEDGE: I think, Bettie, you're getting toward when deliverables start coming out.

DR. WILLARD: Well is it appropriate for us to see it and go over it and review it?

MR. RUTLEDGE: Well the major deliverables would be - the first thing the Panel would probably see coming out of this short of some unseen things, well anything could happen during this period, but short of that would be a draft of the Detailed Development Plan which would occur a couple of months prior to that submittal date, and that Detailed Development Plan would cover the entire spectrum like the Utah plan we recently acted on. As far as the PSD, the Detailed Development Plan usually corresponds to what's in the PSD, so you have the meat of it there. Additionally, the lessee will submit it, we are provided with copies and it's available any time anybody wants to look at that through the copy we have.

MR. ASH: The real actions, the things for consideration now, as Pete pointed out, is this interim operational program, operational plan, and the interim monitoring plan. As I say, the interim operational plan I don't see it has in itself significant environmental aspects, so I don't know that the Panel needs to see that before you act on it, other than knowing what it is. Are there other thoughts from the Panel members?

Okay, then more germane to the Panel's role, perhaps is this interim monitoring plan, and again I would like to go through it by the work group areas, the environmental work group areas and see if there are comments or suggestions questions on that. Starting again with water supply and quality, Deborah Linke.

MRS. LINKE: Thank you, I guess I'll just read our very brief comments: "We would like to note that some of the monitoring changes for the interim plan may have the potential to affect some of the existing permits, and we're just simply noting that the lessees should very carefully review these changes for conflicts with their existing permits. We are also concerned that the appearance is created that non-activity on the tract constituted the overriding criteria for water quality for selecting the monitoring parameters and sampling schedules. Now it occurs to us that many of the water quality impacts, particularly the ground water impacts resulting, for example, from C-a retorts may be detectable only in the next few years, and we would like to suggest further or more detailed display of the criteria you used in designing the interim water quality monitoring program because it appears that there were some that are just now coming out, and this might be misleading to some of the casual observers."

MR. ASH: Deborah, I think you are alluding to C-a where they have had some retorts on tract.

MRS. LINKE: I mentioned particularly from the C-a retorts.

MR. ASH: Okay. Do you have anything on water for the C-b interim monitoring plan?

MRS. LINKE: No, we prepared one as a general kind of comment on both, and in some cases it's just not displayed. It appears that there were several other criteria used for selecting the monitoring program for both, and we just used the C-a retorts. We had that general comment for both C-a and C-b.

MR. ASH: Okay. Any response to that?

MR. RUTLEDGE: Glen, could you tackle it overall?

MR. GLEN MILLER: I think we've identified especially the ground-water impacts, the direction of the impacts, and in a lot of cases the magnitude, and where their dewatering and reinjection has resulted in pretty much of a stable system, the zone of depression doesn't seem to be expanding very fast. We think we can continue to have enough monitoring points to evaluate what happens down the road, as long as there is no further activity, no increase in dewatering or no decrease in dewatering, that type of thing, as long as things stay stable. It would always be nice to have some fill-in points but as far as changes from the past record on the wells and springs and streams that they measured, I think we have a pretty fair handle on that.

MR. RUTLEDGE: One thing, Glen, I can see where the concern might come up with regard to the retorts in place on C-a. To date, the water streams are kept separate. The mine dewatering is handled separately and reinjected. The water the retorts produce again is handled in a separate stream and is placed in the solar evaporation ponds. That procedure is to continue. So far from the monitoring I've seen, and correct me if I'm wrong, Glen, we haven't seen any effect from retort water, on the general stream.

MR. MILLER: Well one of the diagrams this morning sort of alluded to it, but the ground-water gradient at C-a is toward the mine, toward the sumps where the water is pumped out of the mine, so that any mingling or comingling of retort water with that water would show up in their fairly frequent monitoring of that discharge water, but the two streams are kept physically separated and as long as that ground-water gradient is toward the mine and not away from it there is little chance of anything escaping from the retorts.

MR. RUTLEDGE: I just happen to have brought this along. The major impact as near as we can determine is on the dewatering of those mines. As you look at these two depictions of the cone of depression, the first one is on Tract C-a, and this was the situation in December of 1979 and at that time they were pumping from wells and dewatering from the shaft. There was maximum drawdown you might say, and they had just begun to use the reinjection system. But as of December this is the way the cone looked, the three blue dots were the injection points at that time, see it's extending along the northwest-southeast joint pattern. Okay, if you look 1 year later when things have stabilized more, this is actually almost 2 years later, when the reinjection has been increased according to those dots, and I believe some has been increased and there's been some reinjection also in the northwest corner which doesn't show on this one. You can actually see how that cone has reduced and stabilized. Now this is being monitored by a whole slug of wells and that will continue. And just to prove I guess that if you look at C-a and then attempt to generalize that across the basin you're going to be in trouble, because there are differences. You know we do try to model the whole basin and that's valuable, but you have to look specifically at the individual project. You see in December of 1979 what the drawdown was on Tract C-b and I believe at that time we had just begun to encounter the major aquifers, there wasn't a lot and it was associated primarily around the VE shaft, and you can see how that cone has expanded to this in September 1980. The reason for this is the aquifers in this case are really being depressured, they're confined, what you see is the release of artesian pressure. Are there any other comments you wish to make on these two, Glen, or does that cover it pretty well?

This in addition is being monitored and will continue to be. C-b of course does not have any retorts or really any source of contamination from underground; C-a handles them separately to keep it from getting intermingled and so far we have seen little results from what we're doing there.

MR. GLEN MILLER: I might add one thing, that the pumping rate from C-b, the total amount of water pumped has been a lot less than from C-a. The great effect, pressure effect, is more the cause of that, even with the less water, because of the confined condition of the aquifer system there, or more confined.

MR. ASH: Any other comments or questions on water supply and quality relative to C-b's monitoring program? Okay, how about air quality?

MR. GEISE: No comment, We really haven't looked at that and I haven't talked to anybody about it, so I can't intelligently comment.

MR. ASH: Okay, anybody else from the work group, any thoughts on that particular thing? We will have copies of that interim monitoring plan and I'm sure Pete will be happy to receive any comments as long as they are not delayed too long, if you can get them together in the near future. Okay, how about wildlife? Hal Boeker.

MR. BOEKER: The interim monitoring plan for Tract C-b provides broad continuation of ongoing work involving wildlife resources. Generally our committee is very comfortable with the scope of monitoring as currently proposed during the interim period. There might be one exception and I don't know if Ed wanted to respond - if the Battelle contract does not get off the ground, would this change the scope of small mammal surveys as you currently propose them?

MR. BAKER: Hal, we have high hopes for their work. Like I mentioned, we do plan to monitor the sprinkler area, which is the one impact area that we have up on the site, and it really hasn't shown any large effect or change in small mammals. One of the reasons we feel that we can drop the small mammal program is that it has changed very little over the years. There have been very few surprises. There's been very few mitigation things you can do for small mammals. If you go in and disturb a site there is very little you can do for them. If there was a large amount of variation, you know, we would think it was important to continue that. But we've been seeing pretty constant things you could relate to climate, problems with predators, climate or what-not affecting the populations, but we really have not seen any surprises out there. Now with deer, we've had a harder time getting a handle on what's been affecting them out there, what causes them to change their migration routes, and things so we have concentrated on what we feel are the most important ones. Maybe we are leaving out the small mammals because of, oh, poor data collection and also the importance.

MR. BOEKER: You do plan to continue in your pinon-juniper transect areas?

MR. BAKER: We will have one in the sprinkler area, and in order to have control, to show control, for that sprinkler area, that impact area, we will sample in that chained pinon-juniper, which is a similar vegetation type.

MR. BOEKER: Andy Heard, do you have a comment or two with regard to the interim monitoring plan?

MR. HEARD: Not except to say that we are comfortable with the arrangement.

MR. BOEKER: Mary Ann Grasser is not present currently. I don't know if anyone else has a comment they would like to interject at this time.

MR. ASH: Okay. And Surface Disturbance and Rehabilitation, Carter Gibbs.

DR. GIBBS: We have had in our group considerable discussion of the interim monitoring and our major concern seems to have come down on the thing that - seeing that we're dealing with vegetation, which is our responsibility - that is concerns about reinstituting monitoring before either construction or commercial development. Our recommendation, Hank, in general would be that consideration be given to reinstating monitoring two or more growing seasons before the onset of increased activity, the

rationale behind that being that if the period is at all extended you are looking at baseline data that may not give you a good measure of what should be happening, if the ecosystem from a vegetation standpoint is in a downward trend and there are fluctuations in these kinds of ecosystems, something that occurred after or during development might be erroneously attributed to development rather than a normal trend. We think this beginning monitoring before any increased activity would give a firm base for evaluation of the impacts of development, and I would open the floor to any other members of the committee who would like to speak to it.

MR. RUTLEDGE: I wonder if Ed Baker, whether you have any comments on how well you believe that the reduced, well, terrestrial flora monitoring will maintain the baseline and catch any trends that occur during the period.

MR. BAKER: We do plan to monitor the major vegetation types, chained pinon-juniper type up there and we feel that the main impact we may see out there is the grazing impact. We've opened up a lot of new watering sources up there and provided that intentionally as part of our mitigation program. It may change some of the grazing patterns there, so we recognize the need for continuation of some monitoring. In answer to your question on maybe two growing seasons prior to our construction phase, I think if you realize what the type of construction that we will do, say in 1984 when we start doing some construction, we'll be doing very little additional surface disturbance up there. In fact, I think by 1985 or 1986 there will be no more than what we have already disturbed up there at this time, in which we've seen no impacts on vegetation to this date. So what I'm saying is it takes you 3 or 4 years to build that plant and so per the terms of our interim monitoring plan, 6 months prior to any construction we have to start up our developmental monitoring again. Actually that probably gives you, like I say, 3 or 4 years prior to when you start disposing of all that process shale or raw shale out of your project. So it does give you some lead time.

MR. ASH: Bettie Willard.

DR. WILLARD: Have you been able to determine any effects at all of dewatering on vegetation?

MR. BAKER: No, none at all. Our surface water sources, seeps and springs, we haven't seen any effect on those that we could attribute to dewatering, and most of our vegetation, 99 percent of it, does not depend on ground water for growth. Now for the small percentage that does, no, we haven't seen any effects at all, and we wouldn't expect to. Glen Miller may talk more on this, but it seems from our monitoring program we've got shallow, what we call alluvial wells, that measures water very close to the surface, and we haven't seen any impacts on that water. Now where we see impacts is on depressurizing that water that's down 1,200 feet underground. So to answer your question, no, we haven't seen any impacts, and I really wouldn't expect to see any either.

DR. WILLARD: So there's no real connection between the surface water and the real ground water in this case, is what you seem to be saying to me. I'm not sure, I'm just kind of asking you.

MR. BAKER: To make it very plain, yes. We haven't seen any impacts.

MR. HANSEN: Could dewatering lead to any kind of long-term subsidence?

MR. BAKER: We don't know. I'm sure there are differences of opinion, maybe even in this room, whether we will eventually see that. My personal opinion would be no, we will not, unless something happens to fracture that upper zone so that that water can go down into the depressurized water zones.

DR. GIBBS: I guess there are no other comments from our group.

MR. ASH: That completes the work groups that appear to be involved with that interim monitoring plan. We had also listed the socioeconomic work group but they are not directly related to this interim monitoring plan. We have had, I think, since our last meeting another one of C-b's socioeconomic monitoring reports distributed, and I might ask is that continuing, that effort?

MR. BOB THOMASON: Yes, we plan to continue our monitoring of the socioeconomic programs but on a less frequent basis unless we resolve ourselves down to a lower level of employment but we will maintain our presence there.

MR. ASH: Thank you. Marla.

MS. MANSFIELD: This is not a direct comment on any of the monitoring programs. There has been a legal decision recently which might be of interest to the people who are concerned about socioeconomic impacts. As you might be aware, the BLM sold to the town of Rangely certain land at fair market value to aid community development for housing and some commercial development. Certain landowners in the area went to court over this, trying to argue that the price was incorrect or, well the judge characterized it as that their monopoly control of the land market in Rangely being interfered with. The BLM and the town of Rangeley did prevail in this lawsuit. The court's decision was quite interesting, because it stated that the private land owners did not have standing - they could not object in court to a decision by the Bureau of Land Management to sell land to a community at fair market value. On this decision, we do not know yet if the private parties are going to appeal it; the appeal period has not yet passed, but from my viewpoint was a nice decision giving the BLM discretion and some ability if it so decides that there is land and a community project, that it can sell land at fair market value to the community.

MR. ASH: Thank you, Marla. That completes our review then of C-b's interim monitoring plan and, Pete, we will assemble the few brief comments and concerns that have come up into a memorandum to you.

I want to now return to workgroup comments on C-a's scope of work modifications, that we talked about this morning and deferred work group comments until after lunch. Obviously I am deviating from the schedule here. What I propose to do is to do that work now and then we are supposed to have coffee this afternoon at a break at 2:30 p.m. or a quarter to three, and take our break and then come back for Paul Ferraro's presentation. And so let's go back then to C-a's what we might also term interim monitoring plan, which is confusing; each one has a different title. We have had from Deborah that work group's comments on water quality which apply to both of them and which you all have responded to. I'm not sure whether we need to formalize that or not, but in any case in that area are there other comments regarding C-a's plan on their water quality aspects of their monitoring plan? Okay. How about air quality on C-a's monitoring plan?

MR. GEISE: I'm in the same situation on that one, Hank. I'll try to get you something very quickly on that.

MR. ASH: Any of the work group members want to comment? Mary Ann is not here. Paul, you're the only other air quality work group member here. Any comments on C-a?

MR. FERRARO: I didn't sit in with that group. I don't have any comments.

MR. ASH: Okay, then the third work group is wildlife, Hal Boeker.

MR. BOEKER: Well the comments that were made with reference to Tract C-b stand with regard to C-a. There is adequate monitoring coverage provided in the interim program with perhaps a little more concern over the small mammals than what was expressed with C-b, because in this interim program C-a indicated that they will be stopping their small mammal sampling in lieu of the Battelle work that would be done, and they expect to have been notified by April 1 whether the Battelle contract was consummated or not. I was wondering, then, in the absence of a valid Battelle contract whether C-a has a proposal for continuation of any kind of small mammal monitoring.

DR. CARTER: Basically it's our understanding at this time that Battelle and, I believe, the Bureau of Land Management are still attempting to negotiate a contract for the sampling programs around C-a and C-b both, and we are at this time in limbo basically waiting to see how that falls out. If it turns out that for some reason they can't negotiate a contract, then we would have to sit down with the Oil Shale Office again and work out a program, perhaps continuation of what we've been doing, by a reduced program. It's very much up in the air right now. I'm not sure what phase those negotiations are in but it is my understanding that they are still continuing.

MR. BOEKER: Thank you. I have no problem with whatever negotiations may come out with between C-a and the Oil Shale Office in that regard.

MR. RUTLEDGE: Hal, our problem with this, and it's been beat around, I'm not sure everybody understands just what it is, but Don Dietz can correct me if I'm wrong, but the issue has been raised that the methodology that's been used by everybody is basically no good, because the data that result does not allow you to state what the condition is within a reasonable competence limit. Now is that a reasonable statement, Don?

MR. DIETZ: I think that's basically so. We are trying to work out a cost-effective monitoring method that has a certain amount of validity and so far the variances are too high, one way or the other. One of the reasons we are worried about small mammals is not the importance of small mammals per se but it may be our best indicator of some animal life form that might be affected probably by one of the air pollutants because they are about of the only resident animals types on the tract. That's why we don't think we will pick it up with deer and birds, because they can pick up a contaminant somewhere else and come on tract, so we think that warm-bodied small mammals are probably the best indicator of an effect. That's why we are concerned about trying to get some good sampling.

DR. SLAWSON: But only if they could be sampled in a manner that allows you to make that determination?

MR. RUTLEDGE: So anyway we are sort of in limbo now until we work out something on that methodology.

MR. ASH: Other comments on Wildlife? Hal, is there anything else or anything from your group.

MR. BOEKER: I wondered, Andy, did you have any comments regarding Tract C-a?

MR. HEARD: No, I think you've stated it well, the comments for C-b stand for C-a.

MR. BOEKER: That's all of our comments, Hank.

MR. ASH: Then Surface Disturbance and Rehab, Carter Gibbs.

DR. GIBBS: Again our comments on C-a are very similar to our comment on C-b, as our concern that the interim program seem to be adequate. We are concerned with the startup of monitoring, particularly in the case of C-a where there's an undetermined and an uncertain time period before construction will begin. It may be a fairly extended period and our comments on C-b are probably more applicable to C-a. Any other members of the group would like to speak to that?

MR. ASH: Dr. Slawson.

DR. SLAWSON: I have a question I guess about your comment concerning the need for vegetation monitoring again in the preconstruction mode before we start up again. As far as what you feel would need to be monitored and what sorts of impacts you would be dealing with. In the initial construction phases, the monitoring, or the potential for impacts on vegetation are from land-clearing type activities and not anything more subtle from air emissions or whatever that might cause vegetation stress downwind. I have a question about what exactly you think would be monitored in that period, and also I would like to note that we have been monitoring the vegetative community since 1974, since the fall of 1974. What additional information would be added in that incremental time period you mentioned 2 years prior to construction that we don't already know?

DR. GIBBS: We were talking about two growing seasons, rather than 2 years, which would be about a year. Our concern is basically of updating your baseline. In other words, if you have insect infestation, you have a period of, as we had in this country, in the late 1960's a very severe drought. You might have some changes in your baseline either up or down that might be attributed to development when actually they were a natural perturbation. We really were looking at your being able to speak specifically to what caused the change. In other words, if you were in a dry period for the 2 years prior to your startup and then you take, using your original baseline as your base for an estimate of your impact of development, you might come up with an erroneous decision. Our concern is with protection for both sides.

DR. SLAWSON: Well as we indicated in the program with the color infrared photography, for example, that sometime prior to construction we would have those flights prior to construction to give us a link between the data string that we have now. Any aerial photography work would have to be paralleled with at least some ground trailing-type surveys to again solidify that data base. So that link would be established between the period now and the interim really doesn't pose any problems as far as having a break in that data string.

DR. GIBBS: That's the kind of thing we're talking about.

MR. RUTLEDGE: Unless I'm missing something or my copy happens to be in error, the vegetation composition, density, productivity, shrub productivity, utilization, microclimate, deer-days use would basically continue as it was in the development program.

DR. SLAWSON: Yes, through this growing season at any rate.

MR. ASH: Bettie Willard, did you have something? (No). Okay, any other comments or questions regarding C-a's plan?

MR. LUCAS: Yes, on the C-b plan, it was referred to that there was a requirement in the lease that they start up monitoring 6 months before or something. Could you clarify that (Mr. Baker said that).

MR. RUTLEDGE: There is a requirement in the lease that once you've started your baseline and if for any reason you quit, then 6 months prior to start of any activity you have to restart, but all through the program, even during periods of suspension of operations we maintain the continuity of that; it's never really come into being. I think what Ed was referring to, if he's still around we can ask, that in the interim plan I think there is a commitment to go back to, on C-b it's the development monitoring program, some 6 months before, was that basically it, Ed? He's talking more about the commitment in the plan rather than invoking that lease term.

MR. ASH: Okay. Thank you. That completes our consideration then of C-a's interim monitoring plan. Since the coffee's not here we'll change the agenda again and ask Paul Ferraro if he's prepared to give us his presentation. This incidentally was given at the Oil Shale Symposium in Golden 2 weeks ago, and I got one copy from him there and then asked if he would like to talk to the Panel about it. I think it is an interesting effort going forward here.

MR. FERRARO: What I have I will pass out. I have the paper that wasn't really presented, I have a modification. My presentation doesn't follow 100 percent with the paper. Certain of the vignettes I'm going to be talking about today are in the paper, and I believe I have enough copies for everyone to have a copy. The reason I have a longer presentation is that some of the information I'll give you today is preliminary and it will come in the draft report, it might be changed a little but I just want to give you a little flavor of what we have in mind and what we're doing, and I don't want to have the proceedings of the Oil Shale Symposium come out a few weeks before or after our report and there would be some potential conflicts there. That's the reason.

We are doing an assessment of the cumulative environmental impacts in northwestern Colorado. Yesterday you heard about the cumulative impact task force and their charge is to evaluate the socioeconomic impacts of oil shale development and other energy developments in northwestern Colorado. Our charge is to look at the cumulative environmental impacts and that's what I am going to cover today.

First of all, I want to give you a status report and then I want to give you some highlights of the report and then the third thing some preliminary findings. First of all, I guess I should put a plug in for the Colorado Department of Health. Sometimes they are a lost sister in the whole process, but they have some important

responsibilities that are listed here, and I am sure the Panel members are well aware of that as well as the companies, but sometimes they get forgotten in the shuffle, so I just decided that I'd let you know and bring them back to your mind.

Why this study? The study or assessment of whatever you want to call it, we thought about it several years ago, and your former Panel member, Terry Thoem, was instrumental in generating the concept or pushing the effort, and it was an item that became, EPA - there's a State EPA agreement developed every year between Region 8 of EPA and the State of Colorado. One of the items was to do something on looking at the cumulative environmental impact of energy development in northwestern Colorado. So it is a cooperative effort. However, the Department of Health is taking the lead and has the primary responsibility. It's primarily in-house staff work, and we're not hiring consultants to do this effort. It's not going to be, or the first cut is not going to be, maybe as in-depth as we would like it to be, because we have limited resources devoted to this effort. Our schedule, we have developed a work plan and it was distributed back in October, and I'm sure many of you saw it. We hope to have a draft out by the end of June, or close to that, and then we will have a review and comment period during the summer and hope to come out with a final report by the end of August.

Let's look at some of the report highlights. I'm going to cover energy production scenarios and some population projections, land impacts. D is air quality impacts, water quality impacts we're going to cover, and solid hazardous wastes, and the last item will be noise. Then what I'm going to do as I go through these I am going to pick out one and talk about some of the preliminary findings. Let's go to table 1. What we have done is we have selected three scenarios for oil shale, and those are as indicated here 180,000 for both states and then 529,000 for Scenario 2, and then 1,163,000 for Scenario No. 3. We leave the base, other energy development, here constant and the only thing we would vary when we are looking at each scenario is the oil shale. So what we're doing on the powerplants is going from about 551 megawatts now to close to 3,000. We are doubling the coal production. Oil is staying about the same. Natural gas is about the same, uranium goes from 110,000 pounds to 270,000, and obviously the coal and methynol is zero now, and we're going to 5,000. What we're looking at here is we are saying that for Scenario No. 1 all of these will be on-line and this is the production in the year 2000. Then we look at 180,000 barrels per day of oil shale and we look at it at a point when construction is complete, everything in operation, and we are at a plateau and we're saying that that's all that's going to develop in Scenario No. 1, 180,000 barrels. Then Scenario No. 2, we're going to project that out to over 500,000 and then we do that for No. 3. We are not so concerned about whether it really happens in 1995, we're just saying it's going to happen in the year 2000 and that's all it's going to be, or that's what it's going to be.

Now obviously we had to select some projects and we did this in consultation with RMOGA and the companies to try and get a fair estimate of what the production levels are or might be. Now these are not in any way, if you see a number - you don't actually see it because I have not put it in the report - for each project, so what we are saying is these are planning numbers, you may or may not end up with the number that we have selected but we think we're as close as you were on January 1982 and that was the best guess at that time. And like for the White River Project we have 100,000 in there at some point. I think for Scenario 3, C-a and C-b, we have the numbers that you have published right along as to what you are - we do not have 300,000 in there for open pit.

That's a little hard to read, but all we show here are the powerplant, the power units, we're talking about units here, we show just being one plant but two units, coal mines, methanol projects and you can read that better in your handout. We try to show the oil fields and the gas fields on this chart, to give us some feel for where all the activities are, and uranium also is on that chart.

In this report and this is all I do is show agricultural land and in the final report we'll get into other land use to show what the different land uses are in the area. An interesting thing to note is that as far as oil shale, where it's going to be extracted, you don't have a conflict with agricultural land. Now if we go to the next slide you're going to see a potential problem with urban land. Now there are lands suitable for urban development and around the communities. It is hard to read this but you've got the best land for urban development where you have the best agricultural land. So you do have a conflict there, and I just do a little analysis that I'll show you in a few minutes, of a potential impact between agricultural and urban development.

Here we tried to identify the areas where you've got endangered species or threatened species and we just identify them, how much we can do with this within the final report, it is still being discussed internally, but at least it gives you some feel for where they are and some of the potential problems that may come up. What I want to do now is stop a second here and take a look at some of the possible impacts on agricultural lands and I make some basic assumptions as we go along.

First of all, we are talking about six counties, and I guess I failed to say that at the start, but I hope the map showed you which ones we are talking about Routt, Rio Blanco, Moffat, Garfield, Delta, and Mesa. Now in the six counties I just wanted to show you the number of acres of farmland, cropland, and irrigated lands, a total of 11 million and here's the percentages. Now let's look at the next slide and see what are the potential impacts. Now I make a basic assumption for this worst case here, for urban development, if all of the land that is going to be utilized for the increase in population needed to accommodate all of energy development and all of the oil shale workers, here's the land that you would need to accommodate them, so that goes from a low of 4,000 without oil shale but energy base, up to 16,000 acres. Now I say here for oil shale site development there really is very little impact here with agricultural, so you almost have zero there.

MR. BUBRISKI: Is this 11,000, 16,000, whatever, is that based on single family homes, 1-acre, 5-acre lots, mobile homes?

MR. FERRARO: It's a mix, an acceptable mix. Item No. 3, I make a worse case situation. We are going to get all the water for oil shale from agricultural water rights, which is the worst situation, which is not going to happen, so what's the impact of doing that? What happens is you go from a low of 8,600 acres out of production to a high of 70,000. What does that mean in terms of percentages? If you're taking all the irrigated lands out of production you've got a low here of 1.7 percent, a high of 30 percent. Now I realize these are extremes, its only purpose is I was trying to illustrate here and will maybe be refining this a little, is to get some feel for the worst case situation and see how really bad it is and where maybe further work needs to be done or what kind of evaluation. So that is just kind of an example of some of the impacts you can look at.

I've got ahead of myself. I have to go back now, I jumped too fast trying to rush here. Let me go back on the population projections. What we intend to do on population projections, the first slide I had there. I just want to mention here what we hope to use. Mountain West has developed a model that is being reviewed right now and seems to be accepted. It's a model that Bureau of Land Management has helped finance and the State, and what it does is you input the employment numbers from all the facilities and then it generates a population projection by county for the year, whatever year you want up to 2000, and then it allocates it by community or school district or whatever subdivision you want. So we hope to plan on using that in our final paper, or final report.

Now can we jump all the way back to air. Now back to the highlights of the report. We plan on looking at total energy source emissions, total secondary emissions, PSC increment assumptions both from oil shale, which I'll talk about a little more today, and then the impacts from secondary sources. We're going to do a little on visibility but that's going to be utilizing some of the reports that have been done on that before. Acid deposition, there are some things we would like to do on that if we can get the cooperation of some other agencies, that one I don't know how far we are going to be able to go with. We think we can do some general things, but again that's a very controversial issue and how far we can carry that, but we intend not to leave it unnoted.

Let's look at some of the preliminary results of the model that we had, Systems Applications, Inc. (SAI), ran a few runs for us using our scenarios but we have to thank BLM because BLM paid for the development work of this model, and so we were able for a few extra dollars get our runs made. So we hired them, that's the only outside work that we have done to date is to have them do the air quality PSD increment modeling. This is what they use. These are complex terrain wind models, and the Gaussian puff model, and here's the two parameters they looked at, and here's the time period that they evaluated. I thought I would put this up just to refresh our memory for SO₂. What are the Class 1 increments that we're talking about? Here they are: 2, 5, 25, and then 5 and 10, so if we kind of focus in on this maybe some of the numbers that we present as we go along will have some meaning.

Okay. This is another area of controversy. What do you use for emissions from each of the facilities? Now what I would do in the report is, I am going to do something similar to what was done here, and I may do it by project. I have chosen not to do it for the paper. So I will just put, in the Parachute Run Creek, we are talking about 163,000 barrels per day and here is the SO₂ in tons per year, and then for the whole area here are the numbers. Now these are the numbers that went into the model, and if I were to show you your individual ones you may argue the point. Some of them are from permits and others of the numbers come from a Pedco study that was just recently concluded or is in the final stages for the Park Service. So we, after consultation with EPA, felt that those were the best numbers we had at the moment. So I guess the thing I'm saying here is that we decided to go ahead and show the numbers, and if a few numbers come in lower or higher, obviously the impacts are going to be according to what the change is.

I am not going to read all this, but I will go through the next few slides very quickly. Now one of the things that SAI says is that these results that I'm showing you right now are overly conservative. Now the agencies, including the Department of Health and EPA and others, are a little concerned about these numbers, that their factor of 5 and a factor of 2 overconservative. So I just want to show you if we

play around with those numbers what the results are. Now I think the more realistic approach is to say that the numbers will come out in this range. Now what this is, the 9 is divided by the 2 and the feeling is or the thinking is that maybe the accurate number is somewhere in between these. So I want to give you two numbers in some cases and you will see them throughout here. I'm not going to read these, but just to go through them quickly, it shows the number of violations and the next three slides, we'll put them up there for a second. I am not going to attempt to read them. Next one. Obviously we start getting more violations as we get down into Scenario No. 3. Some of them are right close to the facilities and some extend out to the Flattops. That's the end of Scenario No. 3.

Now you look at the results without taking any factors. These are right out of the computer so according to the modeler they are more conservative so you start seeing violations in the Flattops, at least for the short term. And you see that again it seems to be okay for the annual, but for the short term you're running into violations.

Next this just shows 25 the standard, 80 is the result, 5 the standard, 22 and 2, so you are just on the annual barely meeting - you're using up all the increments to accommodate over the 1,163,000-barrel-a-day facilities, you're getting close to using up all the increments.

All right, let's play some games here. Let's go ahead and say it is overly conservative. Let's divide the numbers by 5 for the short term and 2 and what's the result? Do we eliminate all the violations? No. So under Scenario 1 for the 3 hours we still have violations. You get down here we have violations. We get violations at Flattops when we get to Scenario No. 3 and for the short term.

Now let's play one last game here. Let's divide it by 2 and let's just look at the annual. Divided by 2 we end up with no violations if we're looking at just an annual standard. So our problem which is not new to most of you, again it's the short-term standards that are causing the problems and in some cases they're localized.

Okay. We are at the water quality impacts now. We'll have in the report an overview of water quality, we are looking at the stream classification, surface water, we are trying to do something with ground water, but that's a little fuzzy, how much we really - we are working on it but don't know how much I'm going to be able to put in the report. We look at waste treatment facilities, nonpoint sources, and salinity, and today I want to talk just a little about salinity. I going to give you just a quick rundown through some of the preliminary findings on salinity in the Upper Colorado. The thing I should stress is that the only time you use Utah's production numbers are for air quality. We don't use them for water quality, because we are primarily concerned with the State of Colorado and the only time we see any impact is from air quality, and that's the only time we use it. So everything I have here is just related to the State of Colorado and the impacts of energy development in Colorado on the salinity problem. Now here are the standards and the requirement that the salinity at Imperial Dam remain at 879 milligrams/liter, and then we've got Health Department policy related to salinity for industry, no salt return policy whenever practicable and I know C-a and C-b are very familiar with that, and then for municipalities there is a slight increase that's permitted. I guess the overall approach here is to try and reduce the salinity in the Lower Colorado.

Now putting it in perspective here's where we get our salt loadings and here are some of the projects that have been identified for corrective measures and you see the tons per year that are generated just from these. Two, four, six projects, close to 3 million tons per year, and let me put that in perspective when we look at oil shale and what the contribution is from that. If you look at the overall salt loadings, you see that irrigation return flows are high, 41 percent, and then natural ground water 38 . Right now industry and municipalities contribute only 1 percent of the impact.

Another thing that's critical is depletions that impact salinity in the Lower Colorado and what I did here was just show you that we're talking about 1.8 million acre-feet per year that's depleted in the Colorado River for these different uses, and the export being 541,000 acre-feet per year. Now the projections are that without oil shale, this number on the low side would go up to here, on the high side would go up to here. Now let's see what oil shale would contribute and try to put it in perspective with some of these depletions that have an impact on salinity in the Lower Colorado. I just took a range and said all right, on the low side if we require 5,000 acre-feet per year for 50,000-barrel-a-day facility, and then we look at it for 8,000, that number hopefully is somewhere in that range. Now this just shows you how many acre-feet per year we're talking about. Well for the low end, and again this is just Colorado, we're talking about 16,000 acre-feet per year and there is the high side it's 135,000 acre-feet per year. Okay, let's go and look at the impacts now and see what does it mean. The salinity impacts, what I am assuming here now, is all the oil companies have been saying that, is that they are not going to discharge. Well so that means you are going to take all that water out of the system and it's not going to return, so you're having a depletion situation and so what does that mean on the salinity in the Lower Colorado? Well it does have an impact because you are taking water out of the system. And here we have a low of 1.6 milligrams/liter, and potentially a high for our Scenario No. 3 of 13. Now municipal wastewater treatment facilities have a very small impact on the salinity in the Lower Colorado. What I have here is at \$300,000 (in 1976 dollars) per milligram/liter here is the total financial impact. I think the interesting thing if you look at these numbers, you look at this 4 million total annual impacts versus 28 million from depletions, increase in agricultural return flows, export, you know that is significant on the high end, the low end is 16. So what I am saying here is if the low end of the depletions without oil shale for everything else, you have got a projected impact on the Lower Colorado of 56 milligrams/liter, compared to the high that I came up with over here of 13 for oil shale.

Here are some projects that are underway or in the planning stages to help solve some of the problems and you can see here, this is the Grand Valley, you have got 24 milligrams/liter reduction at Imperial Dam just with that one project which would more than offset the million-barrel-a-day scenario in terms of oil shale alone. So you could actually take care of all of the energy and export, now you're going to have to come down and contract a number of these projects, and I wouldn't want to suggest as someone else has that maybe there is some way of offsetting it by helping fund some of these projects.

All right, the last two items, solid and hazardous wastes, we're going to be looking at the spent shale, the amount generated, the stability of piles, this becomes a very difficult area of hazardous wastes, but we are going to try and address that, and then look at the impacts from sewage sludge and municipal wastes based on the

population increase. The last item is noise impact at the community level, airport, highways, and possibly near the development sites, and what we want to do here is look at the 1980 situation versus the year 2000 for the three scenarios and what the increase in noise level will be. And with that, I stop. Are there any questions or comments?

DR. WILLARD: Paul, how interactive are you getting in this, can you do it or can you get - for instance, I know somebody that's working on the Dotsero potential project in relation to its effect on fish, and I was just wondering how much of this might get into your report?

MR. FERRARO: We are trying to utilize as much of the ongoing studies and work that's available, just because obviously a lot of money has been spent and we have very little time and staff devoted to this, so we are going to try and utilize as much of other people's work as possible. And it's a first cut. The original concept was to try and get some feel for this and then the EPA and the State would look at whether or not they wanted to go into more detail in subsequent years. I'm going beyond the original concept in trying to produce some first cut analysis, and that wasn't even the intent originally, but I thought I would try to go a little into the first cut with some of these impacts and maybe try to identify some impacts that are problems, potential problems, and maybe identify some that really are not that serious and we don't have to worry about them so much.

MS. MANSFIELD: It's obvious, at least from the figures, it's obvious that you are not including unimproved rangeland as agricultural land. Are you aware of any type of studies or reports that are going to take into effect the impact of loss of grazing land to oil shale development?

MR. FERRARO: We thought we'd just focus on agricultural land. We may try to do something with that. The individual that is working on that, I don't know how well he's coming along, but we are looking at that in terms of wildlife, can we do anything with it? A lot of work's going on and we may at least present some facts on it and then stop. If we start getting on real, real soft ground and we are going to back off and leave it and that's like with acid deposition, there are some things that we would like to do and I think we could do it. It just depends on the timing with other studies that are underway, whether or not we can utilize that information.

MR. ASH: Marla, there were some considerations of that sort of things in that original impact statement back in 1973, and we looked at some of those things relative to grazing, and of course in fact, the lease tracts are still being grazed today, but that's the only thing I know of that really tried to look at what that effect might be. Hal.

MR. BOEKER: Paul, in addition to the salt loading impact from agricultural lands, isn't there also some salt loading from grazing rangeland (Yes). You're not factoring that in are you?

MR. FERRARO: Well, we are only trying to look at, the company is saying, well, indirectly saying, I was at a meeting in January where they were very, very adamant about that we're not really going to impact surface water, we are going to keep everything on our tract, and the thing that I wanted to bring out is there is no free lunch here. You are going to have an impact and the impact is on salinity, and

I just wanted to show relatively there is an impact, now if you think 13 is significant? It could be. On the other hand, compared with some of the other impacts from export, it's not as significant as those others, I just want to put it in perspective, which is what I was trying to do here.

MR. WATSON: Paul, you were in on the group yesterday afternoon, the subgroup when we were talking about the inability to sometimes be specific in pinpointing possible source emissions, and when you do cumulative impacts like this, how good, what type of quality are we dealing with. What I'm thinking of is recently, let's take water, for example, what we discussed yesterday. About a month and a half ago the town of Vail was polluting, and I called them and told them I'm looking out the window and I see this white stuff going into this stream which goes into the river. And they let that go on for 2 days, but a town like Vail would never admit, certainly a town like that would never admit - maybe Brighton or Adams City - but not Vail, they say we don't do things like that. How do you really know that you're measuring impacts from energy development wholly, and how do you separate out other unexpected factors?

MR. FERRARO: Well just like with the air. You'd look at oil shale alone and run it through the model and you'd get the impact related just from oil shale. That's what I did with the salinity, you just look at the contribution from oil shale, as you deplete the streams and obviously they do contribute to salinity problems downstream.

MR. WATSON: Well what type of measuring devices are you talking about?

MR. FERRARO: Well I'm using work that's been done by Federal agencies over 25 years, otherwise it would be totally impossible for us to do it. We're utilizing all of their expertise to then relate to what we're doing in our scenarios based on their work. So it's not original work by a long shot. No way in the world we could do it otherwise. We're borrowing, stealing, whatever you want to say, from all of work that's been done in the past, and that's the only way. I am just trying to put it together as best we can from a regional and a cumulative point of view just to make some sense and to be able to come out with some assessments that identify maybe some of those serious problems, and maybe some of them are not so serious, and maybe we can alleviate some of the concern that has been raised in the past.

MR. ASH: I'd like to offer a comment, Paul, in that regard, this Forum has only been one of many, but at many meetings there have been comments and concerns expressed that no one was looking at what you guys are looking at, the cumulative, the regional impacts, and who is responsible, and at some points it seemed we were suggesting individual lease projects might be responsible, and obviously you couldn't make them responsible for the cumulative impacts or the monitoring of them, and if the Panel had anything to do with this being addressed I'm delighted because that concern has been aired here many, many times by members, some still here and some who are no longer with the Panel. And I am glad to see it.

MR. FERRARO: Well it's a first cut, and I'm not promising the world. I hope it is worthwhile when we're done, that it sheds a little light, and then people can evaluate whether it's worth going the next step and getting into more detail.

MR. ASH: Mark?

MR. BUBRISKI: On page 2 of your report the footnote at the bottom pertaining to production projected in Uintah and Grand Counties in Utah aren't included, and I'm

just curious, you know the Moon Lake, you have got the Bonanza Powerplant, and then the White River Shale Project, is there any particular reason why those two were not included?

MR. FERRARO: Well, we're including the oil shale, you look up Scenario 1, 17,000 for Scenario 1, and then we've got 325,000 barrels per day for Scenario 3, so we are including that. Moon Lake is also included, that will be. As you see here I do include 760 megawatts in Utah. What I'm saying is I am not dealing with coal production, if there's any, oil or natural gas, or whatever. I'm not concerned about the impacts from those energy development scenarios.

MR. ASH: Thank you, Paul. We appreciate that.

MR. FERRARO: Thank you.

MR. ASH: What I propose to do is complete our panel business and then break for coffee and invite, any new members especially, but anyone else that's interested to come back after coffee for Eric Hoffman's briefing on the prototype program, its origin and progress, and Eric informs me it's pretty basic so the experts might not get a lot out of it but for new people or people who just like to be refreshed on its history, I would commend that to you.

Relative to wrapping up the Panel business, we have a little section here called Review of Plans and expected activities. I'll turn it over to Pete for his kind of wrapup of where he is at and what he expects to be happening in the next few months.

MR. RUTLEDGE: Well starting with what's been discussed here, Hank, we will await any comments you wish to send us on the interim monitoring plans for C-a and C-b and finalize that action. On the interim development plan, if you have any comments that can come along with it, let us have them and we'll finalize that. On the U-a and U-b final development monitoring program, the same scenario. We will have a schedule change on U-a and U-b to approve when we get sufficient detail to do it, for we're not doing it every 2 weeks, but that will be as you saw it and I don't think that is a big change from the development plan except for the schedule. And we'll probably go ahead with that unless you have some different opinions.

With all that in place that should set the stage for C-a and C-b to go ahead with their engineering work, and the placement of the C-a mine in a standby mode with remote pumping for the rest of this year anyway, and into 1983. Most of the action will be with U-a and U-b, and I can't predict right now what changes in the plans might be coming along but if history is any harbinger, we ought to have a few sometime perhaps by the latter part of summer. I really have no idea what might happen in all the peripheral activities, like "lets lease" more under the prototype program or the permanent program, that might be coming up.

MR. ASH: Okay, thank you, Pete. That leads us to of course is a discussion of when our Panel might meet again. We've talked before and still feel that the thing to do is to have a meeting in late summer or early fall in Vernal, Utah, when the access road is at least much improved, if not totally completed to the lease tracts in Utah and perhaps site development work will have begun, and from what Pete is saying there probably won't be any actions or anything major we'll have to look at from his office before then. So that would look like then our next meeting would be in Vernal or the Vernal area, probably Vernal, and perhaps end of August or sometime in

September, that general time frame for you all in your planning calendars, and if people have particular problems you might let us know if there are severe problems and you're anxious to see what has been happening or is happening in Utah.

The other thing, we will explore a couple of things that were discussed here. One, during this interim our relationship with the additional leasing program, what assistance or involvement we may have in that, at least we will endeavor to keep the Panel informed of progress and developments in that area. And the other thing we will explore, if it works out through the Air Quality Work Group any suggestions or assistance we might lend in that area looking at potential regional problems such as acid rain. And that is about all we have on that score. Is there anything the Panel Members want to bring up relative to Panel business or what we've just discussed?

Okay, then there are a couple of things that I want to announce or cover. One is a note here that came to Elanor David which she hasn't seen, it's from Jack Rigg of Cathedral Bluffs and he says for those going on the field trip tomorrow come prepared for mud! Relative to that suggestion, the second note I have says that the chain law was in effect on the tunnel approaches this morning, and those of you who are planning on heading for Denver this evening you may want to contact the State Patrol relative to road conditions. Those people going on the tour tomorrow I hope you've all got the itineraries for tomorrow. Anyone that's planning on going that doesn't have an itinerary please check with myself or Elanor. Basically we're going to board the charter bus between 7:45 and 8:00 a.m. in the morning. The schedule will call for us to be out of Logan Wash, the Occidental site at Logan Wash, around 2:30 p.m. We have to be down off the hill before 3:00 p.m. because of a shift change so there should be no problem for those people wanting to get back to Grand Junction. Pete's office will have a van that will be going on to Grand Junction. At this point it looks like we'll have the chartered bus come back here for people who have cars back here, and Pete's van can take those that need to catch airplanes directly back to Grand Junction, leaving that site at 2:30 or 3:00, arriving at 4 o'clock then at Grand Junction. So there should be plenty of time. At 5 o'clock we're having Happy Hour and it's your last shot at Roger Tucker so you all better come, and I believe that's in the private room two doors down, I believe it's the Dogwood Room. (Comment: If stuck for time, there's always the Rifle flight, shouldn't be a problem getting into Denver). We appreciate that suggestion, the possibility of flying out of Rifle, but I don't think there will be any problem getting back to Grand Junction. We can slide off the hill probably fast enough to make that plane.

I guess that's everything. I remind you that after coffee you're invited back here to see Eric's little briefing on the prototype program. If there's no further business to come before the Panel, I shall adjourn the meeting. Thank you.

Meeting adjourned at 3:30 p.m.

